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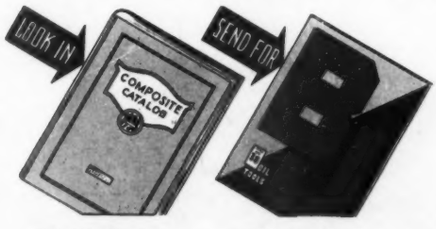

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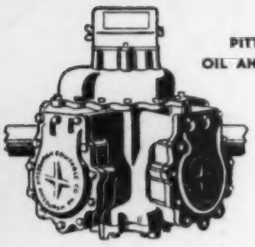

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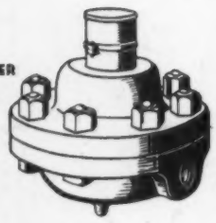

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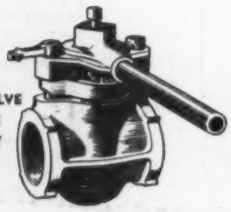

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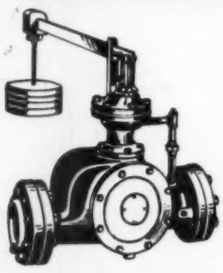

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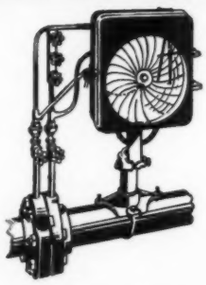

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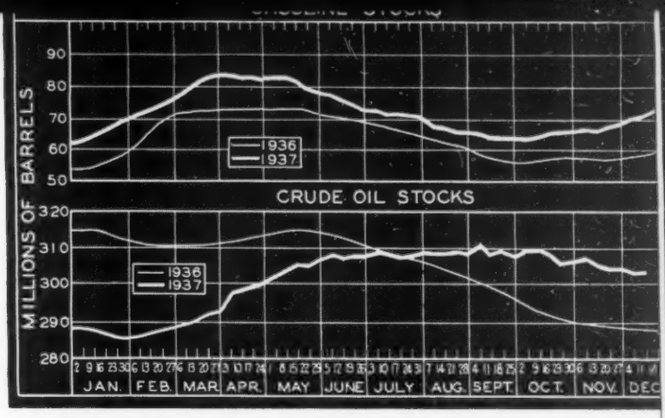


THE oil industry at the start of a new year is confronted with two requisites—one of immediate importance and the other of long-range significance. The first is to prevent gasoline stocks at refineries and terminals from becoming excessive over the next 90 days and the other to add to the known crude oil reserves.

CRUDE PRODUCTION *3,496,118 barrels daily average—up 52,278 barrels.*

CRUDE STOCKS *303,163,000 barrels as of December 11—up 129,000 barrels.*

GASOLINE STOCKS *74,437,000 barrels as of December 25—up 1,149,000 barrels.*

REFINERY RUNS *3,245,000 barrels daily week ending December 25—up 25,000.*

The problem of gasoline stocks has confronted the industry since late summer. There has not been the seasonal adjustment in output that should have been made, reflected in the fact that there has been a gradual price recession in practically all refining areas. Market observers agree that this situation can become more serious before the main gasoline consumption period is under way in April unless refiners curtail their gasoline production in line with domestic requirements which will be at the low point of the year during January and February. In view of the already heavy stocks some observers feel that not more than 6,000,000 barrels of gasoline stocks should be added at refineries and major terminals over the next 60 days.

In regard to gasoline consumption the Bureau of Mines estimate for January is encouraging. It projects an 8 per cent gain in domestic requirements over January, 1937, with a 27½ per cent increase in exports. This indicates that the total gain in demand for the month will be more than 10 per cent. While gasoline buying has been slow during the past month, sellers are confident that conditions will improve with the start of a new year.

The estimated crude production of 1,276,000,000 barrels for the United States and over 2,000,000,000 barrels for the entire world in 1937 tends to emphasize the necessity of continued active exploratory and drilling programs during 1938. It is pointed out that on a basis of established oil reserves this year's production represented 10 per cent of the known supply.

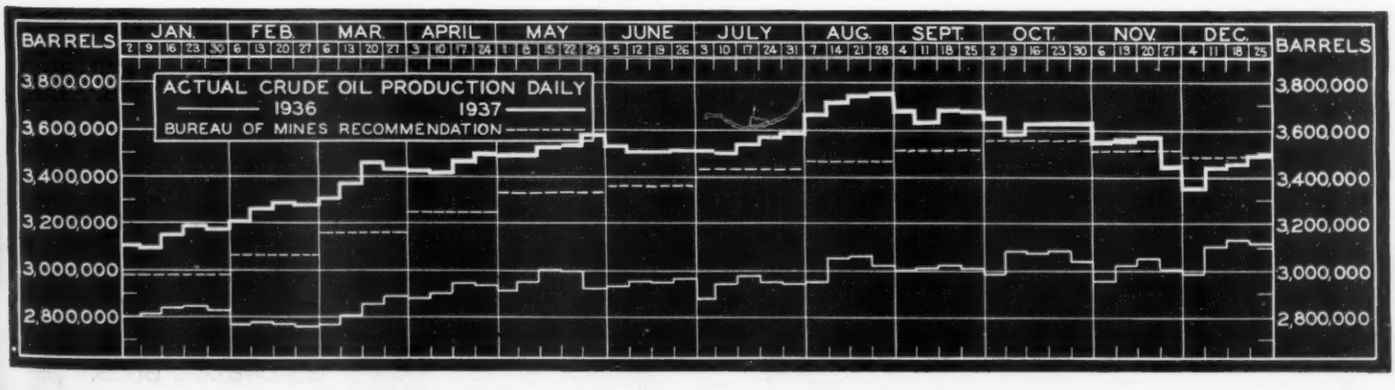
The large gain in crude oil production last week was largely due to the ending of the Sunday shutdown in East Texas. The production for the first time since late November was in excess of the Bureau of Mines recommendations. To comply with the bureau's recommendation for January it will be necessary to reduce national production starting the first of the year. Kansas, dissatisfied with its share of the total market in recent months, has made an allowable in excess of the recommendation. The final plans of other states have not been announced.

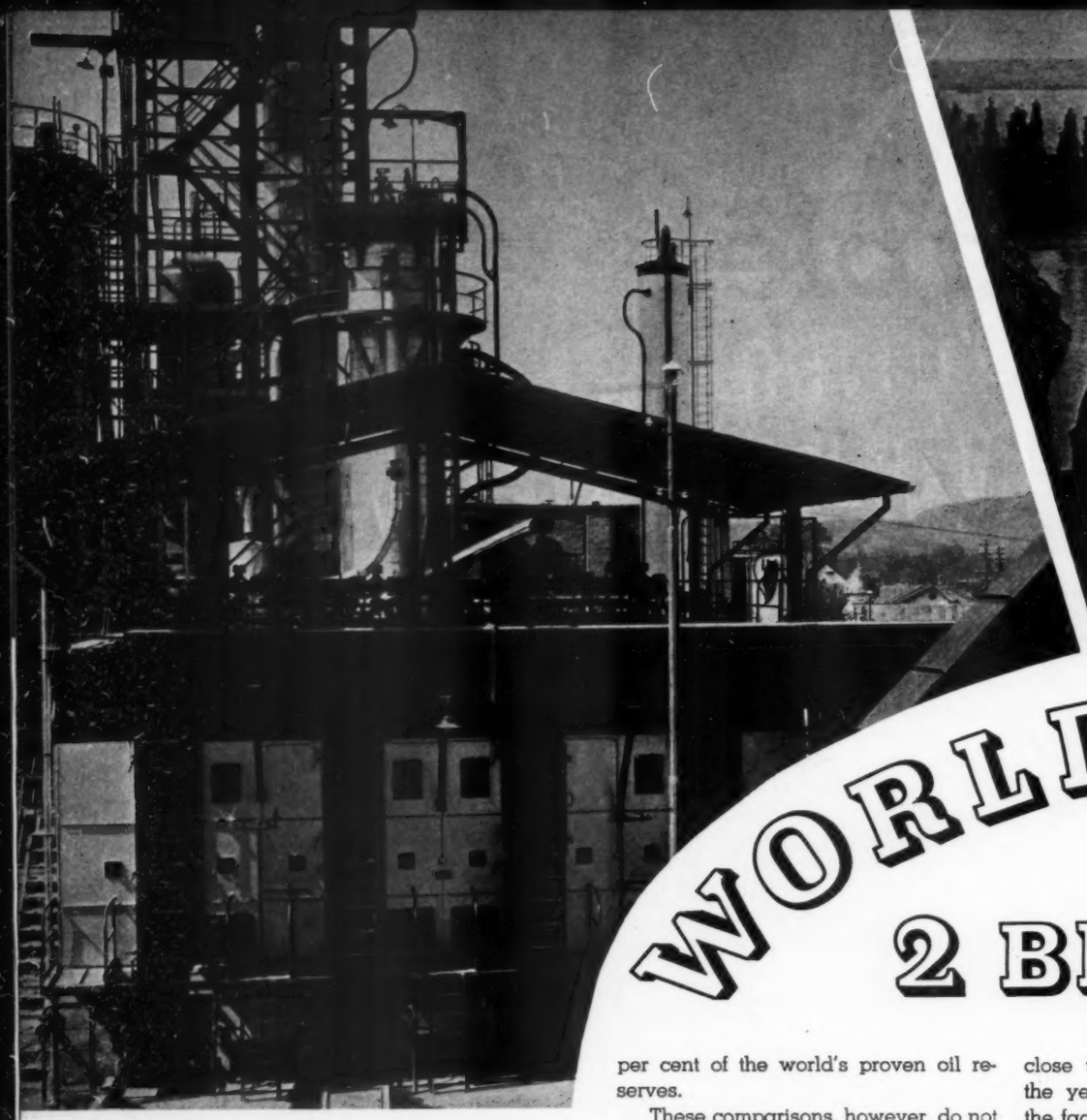
Oklahoma officials have indicated that the state's output should continue under the recommendation levels. Reduced output is in prospect for Texas.

Daily Average Production for Week

	Dec. 25 1937	Bur. Mines Dec. est.	Dec. state allowables	Dec. 18 1937
Oklahoma City	123,900	.....	.....	138,952
Fitts	75,250	.....	.....	77,225
Remainder of state	351,150	.....	.....	354,000
Total Oklahoma	550,300	588,800	550,500	570,150
East Texas	489,450	.....	.....	418,700
West Texas	192,399	.....	.....	191,450
North Central Texas	105,950	.....	.....	105,750
Texas Panhandle	72,548	.....	.....	77,598
East Central Texas	93,649	.....	.....	94,697
Gulf Coast Texas	329,198	.....	.....	331,450
Southwest Texas	111,800	.....	.....	111,800
Total Texas	1,394,994	1,399,800	1,357,573	1,331,445
North Louisiana	81,510	.....	.....	74,080
Gulf Coast Louisiana	170,850	.....	.....	169,100
Total Louisiana	252,360	244,000	253,975	243,180
California	705,500	679,400	679,400	711,500
Kansas	182,175	186,000	176,700	178,675
Arkansas	45,275	33,900	.....	43,765
Eastern fields	133,850	126,200	.....	134,050
Michigan	51,214	51,800	.....	51,725
New Mexico	107,650	104,100	107,600	107,710
Rocky Mountain area	72,800	77,300	.....	71,640
Total United States	3,496,118	3,491,300	.....	3,443,840

Increase, 52,278 bbls. daily.





WORLD OIL 2 BILLION

Cracking unit located at Campina, Rumania. (center) Producing field, Baku, U.S.S.R.

World crude oil production in 1937 passed the two billion-barrel mark—an objective achieved five to ten years in advance of predictions of many economists.

The production of this 285,000,000 tons of raw material, the transportation over land and water, its manufacture into hundreds of finished products at more than 600 refineries and finally its universal distribution to consumers, entitle the international oil business to first rank for the year in major industrial accomplishments.

By way of comparison the 2,031,655,000 barrels of crude oil brought to the surface during the year just closing is an increase of 238,222,000 barrels over the record-breaking year of 1936. This gain of more than 13 per cent exceeds that of any previous year by approximately 40 per cent.

Considering the data from the standpoint of consumption, the 1937 requirements were twice what they were 13 years ago and more than three times the needs of 1920. It means that 6 per cent of the more than 31,000,000,000 barrels of crude oil produced since the Colonel Drake discovery of 1859 was consumed during the past 12 months. The year's production represents about 10 per cent of the world's proven oil reserves.

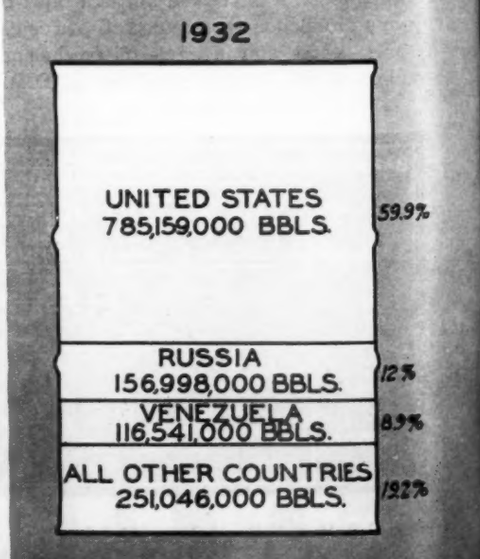
These comparisons, however, do not take into consideration the products obtained from sources other than crude oil and the widening list of substitutes. To obtain a complete production figure for 1937 it would be necessary to add approximately 70,000,000 barrels of natural gasoline taken from the casinghead gas of oil wells and natural gas wells and 10,000,000 barrels of benzol and low-temperature carbonization gasoline. There is also a substantial production of hydrocarbon products from shale oil and other raw materials. Including the production of alcohols and other substitutes, approximately 100,000,000 barrels should be added to the crude-oil production data in arriving at the total supply.

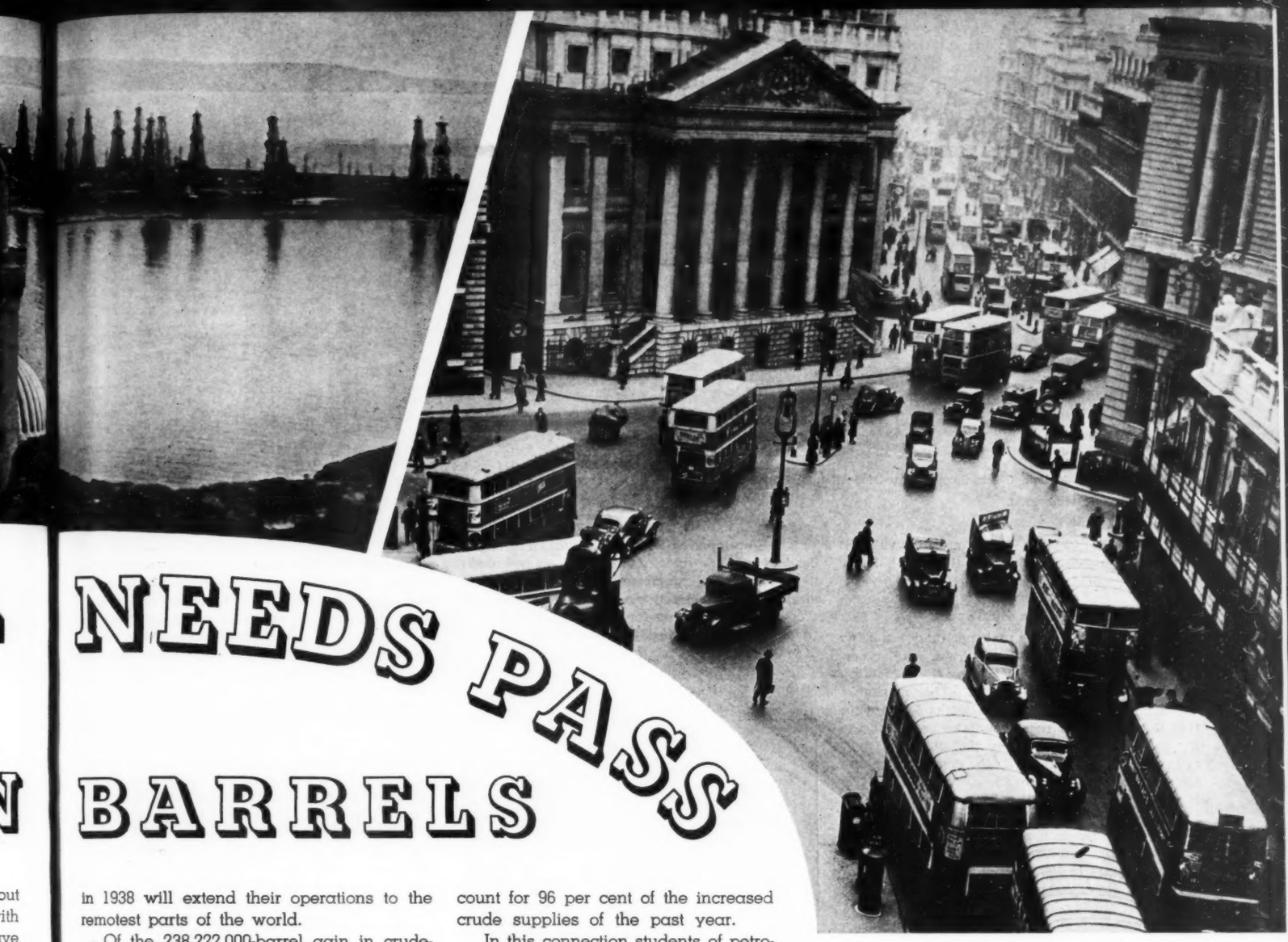
Increased Supply

Most of the world's oil countries brought more crude oil to the surface than in any previous year it their history. Among the countries establishing new records in addition to the United States are U.S.S.R., Venezuela, Iran, Netherlands East Indies, Peru, Argentina, Trinidad, Iraq, Bahrein Island and several of the smaller oil countries. Rumania was the only important country whose production was smaller than in the previous year.

While increases in petroleum supplies have been general, those who have kept in close touch with developments throughout the year have been more impressed with the fact that these gains in most cases have not kept pace with the increased demands. Recognition of this situation has caused the international companies and a few countries to inaugurate the most widespread exploratory programs in the history of the industry. The geologist and the wildcat driller

Crude production 5 years ago





NEEDS PASS BARRELS

London, England. Its streets are becoming crowded with passenger cars, trucks and buses

in 1938 will extend their operations to the remotest parts of the world.

Of the 238,222,000-barrel gain in crude-oil production this year, the United States furnished 177,484,000 barrels, or 74.5 per cent; Venezuela, 31,048,000 barrels, or 13 per cent; U.S.S.R., 7,259,000 barrels, or 3 per cent, and Iran (Persia), 12,860,000 barrels, or 5.5 per cent. Thus, these four countries account for 96 per cent of the increased crude supplies of the past year.

In this connection students of petroleum market trends point out that while the U.S.S.R. increased its production this year, the small gain failed to keep pace with the increasing home demand for petroleum, so that its exports, according to the latest available information, are approximately 40 per cent under the 1936 level. This is a continuance of a condition under way for several years with the net result that the U.S.S.R. is a much smaller factor in world oil markets than it was a few years ago. Only a large increase in Soviet oil production can change this situation, a development which does not appear probable during 1938.

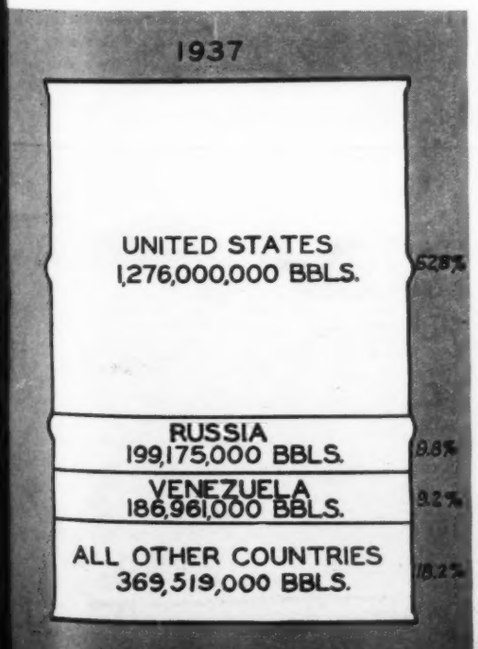
Reliance on Two Countries

The significance of the greater output in Iran is offset to a large extent by the decline of 11,691,000 barrels in Rumanian production so far as European and Asiatic markets are concerned. This decline in Rumanian output was brought about largely by government regulations and taxes which have become so burdensome that oil companies no longer can justify expansion in their operations.

Thus, the United States and Venezuela have been compelled to furnish practically all of the increased petroleum supplies of the past year for a large part of the world. This explains why exports of crude oil and refinery products in the United States for the year will total approximately 175,000,000 barrels, a gain of 45,000,000 barrels over 1936. Observers have contended that had the United States not been able to satisfy this enlarged outside need in addition to the phenomenal increase in its own domestic requirements, many world markets would have been confronted with a serious shortage early in the year.

This comparative situation was not confined to 1937. Going back five years, studies have shown that only three of the principal oil countries—United States, Venezuela and Iran—have kept pace with the steady increases in petroleum demand. In addition, during that period, Iraq crude-oil supplies have become available in world markets through completion of a pipe-line system with terminals on the Mediterranean. The output of this country in 1937, however, amounted to less than 1.5 per cent of the total world supply and cannot be increased substantially until additional large expenditures are made in new pipe-line facilities. Bahrein Island production also has been made available during that period. While of

rs ago mpared with present output



Trend in World Crude Oil Production Over 10-Year Period

(1,000 bbls. of 42 gallons)

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937 est.
United States	901,474	1,007,323	898,011	851,081	785,159	905,656	908,065	996,596	1,098,516	1,276,000
U.S.S.R. (including Sakhalin)	85,422	100,641	*127,360	165,576	156,998	157,178	177,199	184,024	191,916	199,175
Venezuela	105,749	137,472	136,669	116,613	116,541	117,720	136,103	148,360	155,913	186,961
Rumania	30,773	34,758	42,759	49,741	53,881	54,020	62,063	61,371	64,991	53,300
Iran (Persia)	43,461	42,145	45,833	44,376	49,471	54,392	57,851	57,304	62,565	75,425
Netherland, East Indies (inc. Br. Borneo)	37,341	44,569	46,635	39,393	42,797	47,096	52,065	52,560	54,080	58,500
Mexico	50,151	44,688	39,530	33,039	32,805	34,001	38,172	40,235	40,819	45,900
Colombia	19,897	20,385	20,346	18,237	16,414	13,158	17,341	17,598	18,484	22,234
Peru	12,006	13,422	12,449	10,089	9,899	13,257	16,314	17,067	17,595	19,008
Argentina	9,070	9,391	9,002	11,709	13,139	13,691	14,024	14,295	15,455	16,400
Trinidad	7,684	8,716	9,419	9,744	10,126	9,561	10,894	11,671	13,237	15,155
India, British	8,741	8,747	8,887	8,715	8,817	8,743	10,503	9,218	9,619	9,805
Iraq	713	798	909	900	836	917	7,689	27,311	30,410	31,200
Poland	5,492	4,988	4,904	4,662	4,116	4,072	3,913	3,812	3,737	3,715
Germany	630	704	1,222	1,606	1,608	1,665	2,187	2,967	3,112	3,078
Japan (Taiwan)	1,944	2,023	2,047	1,966	1,630	1,455	1,834	2,208	2,408	2,470
Ecuador	1,084	1,381	1,553	1,762	1,597	1,620	1,637	1,732	1,951	2,166
Egypt	1,842	1,868	1,996	2,038	1,895	1,663	1,546	1,295	1,202	1,165
Canada	624	1,117	1,522	1,543	1,044	1,145	1,417	1,447	1,498	2,773
France	512	535	523	527	530	562	557	539	533	489
Bahrein Island	.....	.....	.....	.....	1	31	285	1,265	4,645	7,700
Other countries	164	196	328	339	440	509	584	594	747	1,000
Total	1,324,774	1,485,867	1,411,904	1,373,656	1,309,744	1,442,112	1,522,243	1,653,469	1,793,433	2,031,655

Other countries include Czechoslovakia, Austria, Albania, Bolivia, England, Italy, Morocco, Algeria, Cuba and Hungary.

*Year ends September 30.

considerable importance in the area in which it was found it now represents less than one-half per cent of the world production.

Distribution of Supply

Excluding these three major countries and the two smaller newcomers, data show a smaller percentage of world oil production by the remaining countries in 1937 than in 1932. This is simply another method used by statisticians in showing that the supplies of these countries are not keeping pace with demand. They also point out that, as in the case of the U.S.S.R., the domestic demand for petroleum products in some of these countries is greater than the small gain in supplies, so that their exports are declining or their imports increasing. Mexico is a recent illustration of this situation. That country's crude-oil production increased slightly in 1937, but due to the large gain in demand, its exports were less than in 1936.

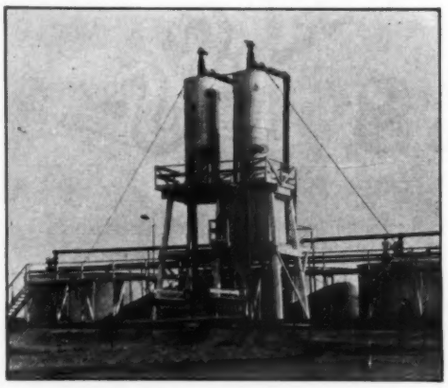
The net result of this worldwide situation has been to halt a trend under way for several years in which the United States was becoming a smaller factor in total world supplies. In 1928 the United States furnished 68 per cent of the world's crude oil, but this decreased to 60 per cent in 1932. Since that time the trend has been upward again, and in 1937 its record output represented 62.8 per cent of world production.

Sources of Demand

War and preparations for war are usually offered in explanation of the large gain in petroleum requirements this year. A study of the available reports indicates strongly that national defense policies account for only a part of the gains in demand.

The Sino-Japanese war has brought an increased demand for petroleum products — particularly heavy fuels for the Japanese navy and gasoline for aircraft and motorized war machinery. It is also true that in preparing for the invasion of China, the Japanese for several years were heavy buyers of petroleum, a part of which was stored.

War preparations in Europe also have brought an increased demand for petroleum over the past



Typical field tank battery in Peru

three years. Relatively little of this supply has actually gone to storage, the petroleum products being needed currently to fuel enlarged navies and supply power for land maneuvers.

More impressive are the greater requirements coming from sources which have nothing to do with war preparations and which reflect the normal needs of people to whom petroleum has become more and more an essential commodity. This situation has been particularly outstanding in South America and several countries of Europe. It has led one competent European observer to state that petroleum demands of a world at peace would expand much more rapidly than one in which many major powers appear to be preparing for war.

Unfortunately, these war preparations have brought extreme nationalistic policies which have tended to restrict the normal increase in petroleum demand in several countries and at the same time foster the production of substitutes. This trend has resulted in almost prohibitive prices for finished products and in some cases forced the use of substitutes with unsatisfactory results. This situation is discussed in detail in a special article appearing in this issue.

Refinery Expansion

The past year witnessed a continuance of the program of modernizing and enlarging refineries outside the United States. This program, which has been under way over the past year, has resulted in these outside refineries as a group comparing favorably in efficiency and quality of products with the best 50 per cent in the United States. The new installations in most cases incorporate processes developed in the United States.

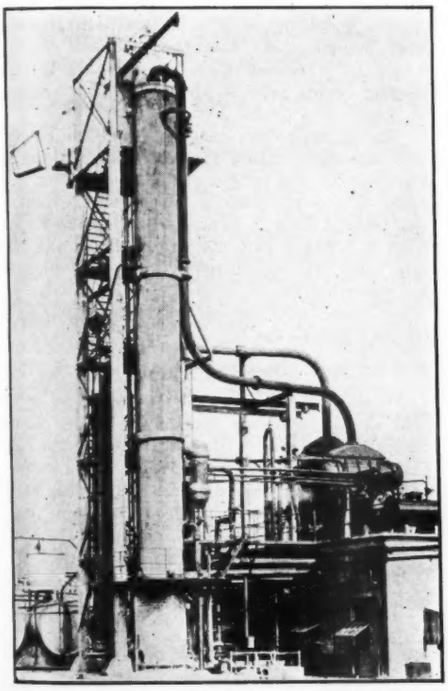
This refinery construction in many instances has been made mandatory in order that owners could obtain the largest possible yields of finished products from a limited crude supply. The fact that octane rating has become more important in motor fuels outside the United States has also been a factor in promoting refinery construction. This

Part of offshore drilling and producing wells at the "Restinga" in the YPF Comodoro Rivadavia oil field in Argentina, S. A.

Who's Who in Japanese Oil

is particularly true in the manufacture of high-octane fuels required for the aviation service.

Reports indicate that from the standpoint of actual crude runs to stills the three largest refineries in the world are located in the Dutch West Indies and Iran. The plant of the Lago (Standard of New Jersey) on Aruba Island and that of C.P.



Atmospheric and vacuum steam heater and pressure distillate rerun unit at Assam Oil Co.'s refinery at Digboi, India

I.M. (Shell) have been expanded so that each now has sufficient capacity to refine approximately 200,000 bbls. of crude daily. The actual runs of one of the plants exceeded that figure during part of 1937. Both plants operate with crude oil from affiliated producing companies in Venezuela. The third plant is that of Anglo-Iranian in Iran. This plant has been practically rebuilt over the past three years, with new crude-distillation, cracking and lubricating-oil units.

Numerous smaller units were completed during 1937 or are under construction at this time. Italy's enlarged refineries have greatly increased the importation of crude oil in that country. Important construction programs were completed in Great Britain. A unit which combines crude-distillation, cracking, reforming and polymerization is now under construction in Argentina.

Dutch East Indies

Sustained production at increased rates in Java and northern Sumatra with more moderate gains in other portions of the Netherlands East Indies, including British Borneo boosted total 8 per cent.

The two chief operators in the islands, N. V. de Bataafsche Petroleum Maatschappij (Shell) and Nederlandsch Koloniale Petroleum Maatschappij (Standard-Vacuum) continued their exploration and acreage acquisition efforts on a vigorous scale. Both companies were active throughout the year in developing proven properties and in adding to their reserves.

Three large concessions were acquired by N.K.P.M. during the year totaling 2,985,625 acres (1,194,250 hectares). Two of the new concessions are in eastern Sumatra, one of 440,625 acres at Moesik and another of 1,037,500 acres at eastern Ogan. The third concession consisting of 1,507,500 acres is west of the Barito River in Borneo.

One of the most important strikes of the year was reported 6 to 9 miles west of the settled production in the Limau field and between that area and the Pendopo pool. The discovery producer was completed by N. V. de Bataafsche Petroleum Maatschappij for approximately 1,000 bbls. per day.

The new atmospheric distillation and reforming plants installed at Bataafsche's Pladjoe plant were in service all of 1937 and the company constructed this year an Edeleanu solvent unit. Additional cracking facilities were installed.

Ecuador

Ecuadorian production was increased for the third consecutive year with an increase of 12 per cent. Anglo-Ecuadorian Oilfields, Ltd., accounted for about 95 per cent of the total from its Ancon field.

The International Petroleum Co., Ltd., obtained a concession covering approximately 500,000 acres of land northwest of Guayaquil and south of the Port of Manta. The concession extends inland from Cape San Lorenzo to beyond the towns of Monte Cristi and Jipi Japa.

In the early 1920's International drilled several wells on and near the Santa Elena peninsula and also drilled two wells north of the concession recently acquired.

Out of the approximately 30 wells drilled during the year by Anglo-Ecuadorian Oilfields, Ltd., more than 25 per cent were classified as deep wells and accounted for nearly 50 per cent of the total footage drilled.

Mexico

Crude oil production in Mexico increased the past year due to the enlarged output of the Poza Rica field, its largest oil area and most important known oil reserve. The field averaged in excess of 65,000 bbls. of crude oil daily. It was announced in November that an agreement had been perfected covering further development of the Poza Rica area which may ultimately rival the Golden Lane field of the early twenties. The agreement is between Cia Mexicana de Petroleo "El Aguila" (Royal Dutch-Shell) and the General National Administration of Oil. It provides for the drilling of a large number of wells by the company and by the government. A large loan to the government was part of the transaction to be paid back through revenue derived from the development of the field.

Governmental regulations centering in labor disputes continued to be outstanding in Mexican oil operations. As the year closed the Mexican Labor Board issued what probably is the most severe order covering labor relations in the history of the oil industry. It provides for higher minimum wage scales with retroactive features. Particularly burdensome are some of the regulations applying to vacations, sickness and other matters applying to the hiring and discharge of employes. The principal operating companies have announced that it will be impossible for them to carry out the new regulations. An appeal to Mexican courts probably will

Type of equipment used in the Poza Rica field, Mexico

Crude oil stabilizing plant recently completed in Iraq to process locally produced crude

be the next step in this labor problem which has held back more rapid development of oil properties over the past four years.

Trinidad

In common with most of the oil producing countries of South America, Trinidad established new records in crude oil production, refinery operations and exports. At the same time new concessions were taken by important oil interests with exploratory work under way at this time. It is hoped by operators that the present proven area of Trinidad will be extended in 1938. Modernization and enlargement programs were completed at two refineries during the year with additional contracts closed for 1938.

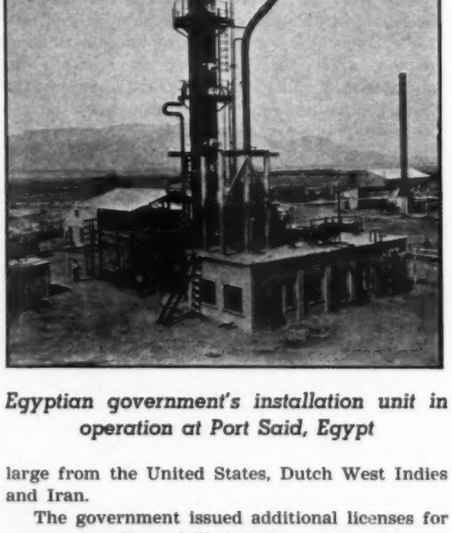
Egypt

Egypt's crude oil production decreased this year but work under way or completed at its refineries assures that its output of finished products will increase in 1938. The government is taking a more active interest in petroleum and its regulations have been felt in the distribution of products. Exploratory work by American and English companies is under way. Deeper drilling in proven areas and wildcat tests have added little to the country's oil reserves over the past year.

Great Britain

Great Britain, the second largest consumer of petroleum products, continued its efforts to find crude oil within its own boundaries and enlarged its refining facilities to operate with crude oil imported from other oil producing countries. Its consumption of gasoline and most of the other petroleum products reached new peaks with continued expansion in prospect for next year.

Refinery construction included one new plant and the enlargement of two existing plants. The refining capacity is still far below domestic requirements and imports of finished products were large from the United States, Dutch West Indies and Iran.



Egyptian government's installation unit in operation at Port Said, Egypt

The government issued additional licenses for prospecting. Tests drilled so far as part of a program started in 1934 have been unsuccessful. The principal companies carrying on exploration work are subsidiaries of the Anglo-Iranian, Standard of New Jersey, Gulf Oil Corp. and Shell.

Iraq

Iraq's crude oil production established a new record in 1937 with a small gain over 1936. The production of the Kirkuk field could easily be increased but output is limited to the capacity of the pipe line with Mediterranean outlets which started operating in 1934. It has been predicted over the past year that the pipe line capacity would be increased in the near future through looping of the present line which has terminals at Tripoli and Haifa.

The attractiveness of the crude to refiners was increased during the year through the installation of the largest stabilization plant ever built. The plant with a capacity in excess of 100,000 bbls. daily is located adjoining the Kirkuk field and has a capacity greater than the pipe line runs. The plant removes the objectionable hydrogen sulfide gases and light ends from the crude, thus reducing the corrosion problems in refinery operations.

Bahrein Island

Possibly the outstanding development of the year in oil operations outside the United States, comes from Bahrein Island in the Persian Gulf. Crude oil production was increased and a refinery enlarged so that near the end of the year 25,000 bbls. daily of petroleum products were made available to oil markets touching all but the North American and South American continents.

This marked the culmination of a program which assumed final shape in 1936 when the

Panoramic view taken from the south of the distillation eq

New deep-water jetty built in the river Medway to serve a refinery located at Rochester, Kent, England. The jetty is about 8,000 feet long

Standard Oil Co. of California merged its newly found production in the Persian Gulf with the Far East marketing facilities of The Texas Corp. under a 50-50 arrangement taking the name of the California-Texas Oil Co. Reports from that part of the world over the past several months have shown the results of the merged operations in the form of new marketing outlets. Continued expansion for this American controlled operation is in prospect for coming years.

India

Continued expansion of the Singu field in Burma by extension of Irrawaddy River bed reclamation work on the part of Burmah Oil Co. and addition of new wells in upper India by Attock Oil Co. were the factors chiefly responsible for a small increase in crude oil production.

Most of the new work in Burma was along the Irrawaddy River where Burmah Oil Co. completed reclamation of another sector of semi-submerged land by construction of dykes and fills in the productive portion of the Singu field. The company is still giving much attention to the various means available for draining the oil sands which are known to extend under the center of the river picking up again on the other side of the water.

The most important development of the year appears to be discovery of deep production by Attock Oil Co. at Dhulian in upper India, about eight miles southwest of the Khaur field. At close of the year the company had completed two flowing oil wells, one failure and was engaged in drilling a fourth test. The discovery well was completed at 7,715 feet and has been producing at the rate of about 500 bbls. per day for more than six months.

Entry of California-Texas Oil Co. into the Indian market caused a stir among the established marketers at the time announcement was made during early part of the year. The company, drawing its supplies from Bahrein, spent most of the year installing facilities for handling of products and is now actively competing for available business. California-Texas established stations at Bombay, Karachi, Calcutta and Madras, the major sea bases. Ceylon, an important base of fuel oil shipping, is also one of the points invaded by California-Texas.

Cracking capacity of Assam Oil Co., Ltd.'s, refinery at Digboi has been doubled by addition of a new Foster Wheeler furnace for a Dubbs unit of 3,500 bbls. per day capacity.

International Features

Additional features of this International Number are:

Engineering and operating articles covering oil producing, refining and transportation practices abroad, starting on page 68.

Trends in modern operations are discussed in three languages (English, French and Spanish), starting on page 146.

Attention is also called to the International map prepared in five colors and inserted in this issue showing the location of important oil producing areas, refineries, pipe lines and tanker routes.

Poland

The Polish oil industry's downward trend continued throughout 1937. There are approximately 3,200 active wells in Poland and nearly another 1,000 wells inactive because their producing ability is either completely exhausted or insufficient to meet commercial standards.

The Drohobycz area produced about 65 per cent of all Polish crude oil in 1937. Much of the deeper drilling of the year took place in the Joslo district which produces largely from zones ranging in depths between 820 and 2,500 feet. Most of the districts 1,200 wells are on air or gas lift and the per well daily output averages 2½ bbls.

Operated under jurisdiction of the Polski Eksport Naftowy, prices to the domestic consumers have been regulated on a basis approximately 10 per cent below those prevailing during the early part of 1936, contributing further to the impoverished condition of the business. About 70 per cent of Poland's crude oil production is consumed in the country while remainder is exported, chiefly to Czechoslovakia.

Influence of government support on the Polish oil industry was reflected last year by the addition of a Foster Wheeler two stage atmospheric and vacuum distillation unit of 2,000 bbls. per day capacity at the "Galicja" refinery at Drohobycz. The plant is to start operating in 1938 producing gasoline, kerosene, gas-oil, wax distillate, cylinder stock and asphalt. During most of the year, 25 of the country's refineries were reported operating, but several functioned at only a small percentage of their capacity.

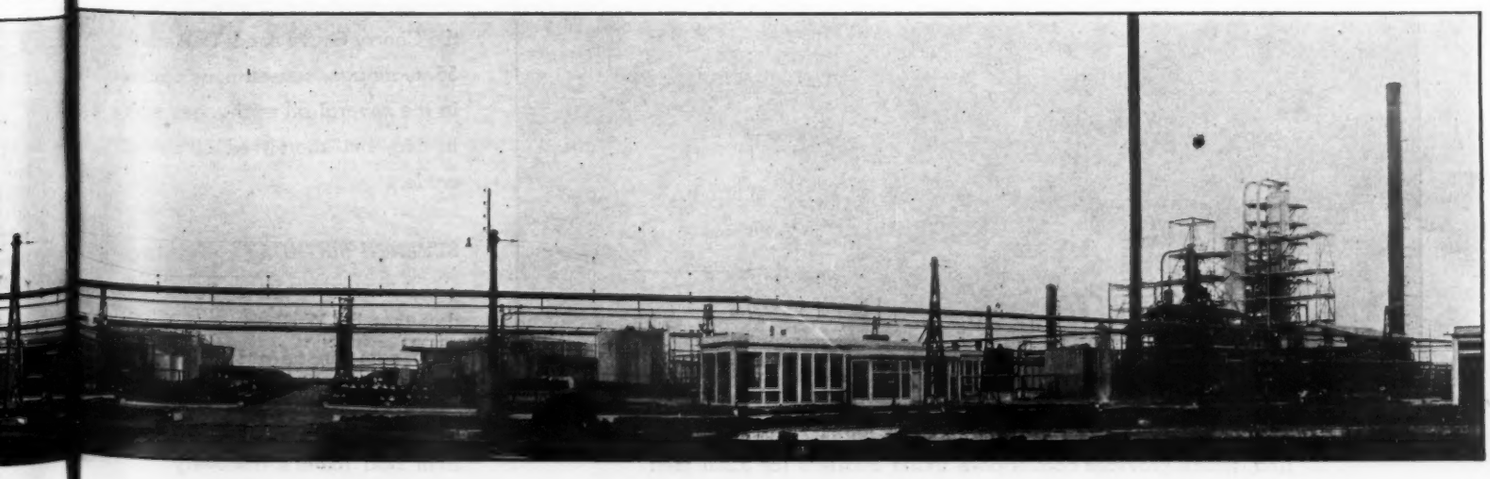
Czechoslovakia

In the bordering country of Czechoslovakia, which is the largest customer for Polish oil exports, the country's first cracking plant was installed by Apollo Mineraloelreffinerie A.G. at Brataslava. The cracking equipment is of the Dubbs design and was placed in active service during middle of the year. The Apollo company also installed a new pipe still at Brataslava.

The Czechoslovakian government owned refinery at Dubova to handle limited production from state-owned wells at Gbely is to be placed in operation in 1938 with capacity of less than 500 bbls. per day. Czechoslovakia's present oil production is less than 400 bbls. per day.

Reviews of developments in other countries will be found in International Section.

ment in the Compagnie Francaise de Normandie in France



SPARKS FROM THE NEWS

PAYDAY

Adventurous souls who bet there would be no reduction in the price of Mid-Continent crude in 1937 are planning how they will spend the money.

REAL SHORTAGE

Next year the oil industry expects to establish a new high in the number of wells placed on the pump. One company has anticipated its needs six months in advance and has ordered 500 units.

MORE GAS LINES

Persistent rumors indicate that 1938 may bring a revival in the construction of major natural-gas pipe-line systems. There is plenty of gas in the fields and plenty of consumers who want the superior fuel.

JUSTIFICATION

"What business have American oil tankers in Chinese waters?" asks the pacifist senator. The answer is the distribution of petroleum products which have done more to improve the standards of living in the Orient over the past 50 years than any other commodity.

PROPHET'S ROLE

Any prophet who in 1920 had said that world oil needs would increase threefold in 17 years would have been without honor. The two-billion-barrel demand this year may seem small in another 17 years.

KANSAS PREPARES

Kansas prepares to obtain more crude markets by producing more crude, as several other states have done over the past two years.

PETROLEUM RUBBER

Recent developments point to a situation in which petroleum may not only furnish the power for the wheels of cars, but also the rubber tires.

SHALLOW PAY

A deep test in the Palo Pinto lime was started in Jones County, Texas. On the way down it stopped at the King sand and brought in a new field.

CARBON BLACK

Close to one-half billion pounds of carbon black will be manufactured in 1938. Of this quantity about two-thirds will go into the manufacture of automobile tires.

NORTH LOUISIANA PROSPECT

A favorable showing in a wildcat test may result in the next field for North Louisiana being located in Lincoln Parish.

PEACEFUL GAINS

World data show that petroleum requirements increase more rapidly in a nation at peace than in one preparing for war. The gains also are more permanent.

ONE OF THE WORLD'S LARGEST OIL CAMPS

General view of the "central camp" of the YPF oil fields in Comodoro Rivadavia, Argentina, which provides comfortable living quarters for 3,200 men

OLD TIMERS

Old-timers in northern Pennsylvania believe the Bradford gusher wells are producing from the Cherry Grove sand. That sand, 55 years ago, caused near panics in the several oil exchanges with its big, but short-lived output of crude.

SEVENTH BIRTHDAY

It was seven years ago Tuesday that Ed W. Bateman's No. 1 Crim came in as a 15,000-barrel well to prove the vastness of the East Texas field. It was 10 miles from Dad Joiner's discovery.

By Henry D. Ralph

Government Officials Study Mexican Labor Order

WASHINGTON, D. C., Dec. 27.—Government officials are giving careful study to the report of the Mexican Federal Board of Conciliation ordering a new labor contract for the Mexican petroleum industry which may be the subject of diplomatic protests that American companies have been treated unfairly.

This government has not yet taken any official notice of the labor controversy except that Ambassador Josephus Daniels has been quoted as saying he would ask Washington to intervene if the report showed there has been a denial of justice. Immediately after the report was made public, 16 United States and British petroleum companies operating in Mexico issued a joint statement denouncing the report as "a glaring denial of justice." Earlier, officials of several companies declared if the board upheld the recommendations of its committee all foreign companies would close down rather than attempt to comply with the labor conditions proposed. Although British companies joined in the protest there have been suggestions that the united front of foreign companies may be weakened because the British-owned Mexican Eagle Co. has recently obtained important concessions in the Poza Rica field.

The controversy began November 19, 1936, when the Syndicate of the Oil Workmen asked the companies to sign a collective labor contract. The companies declined, and a strike was called May 28, 1937, which lasted until June 9, when an agreement was reached to resume work pending arbitration by the Board of Conciliation. A report was made by a committee of experts on August 23 which upheld practically all contentions of the union, to which the companies filed protests. Most of these protests were overruled by the board in its final report.

The New Contract

The new contract requires a 40-hour week and large pay increases and sets up machinery for workmen's compensation, hospitalization and medical care, housing transportation, and a great many other details. The government estimated the new contract will cost the companies $7,000,000 annually, whereas the companies contend it may cost them at least twice this much. The companies were successful in having the board modify a few provisions, but these appear trivial. For instance, the board held that the overalls which the companies must furnish workers need not be of the best quality cloth, and it eliminated a list of gymnasium equipment which companies were to have been required to install in playgrounds for children of workers.

Probably the most amazing part of the board's decision deals with the ability of the companies to meet the increased outlays. The board upheld in general the findings of the committee of experts that the profits of the companies during the past three years have been about three times as much as their books showed and that their profits during the next two years will be ample to cover the increased costs. The companies claim these estimates are based on purely arbitrary statements and in many respects completely ignore the most elementary principles of economics and universally recognized practices of accountancy.

Economic Conclusions

The economic conclusions of the report include the following observations: "The principal oil companies operating in Mexico form part of large North American or English trusts; they have never been linked with the country and their interests have always been alien, and at times even opposed to the national interests; they have left in the republic only salaries and taxes without in reality having cooperated in the social progress of Mexico; they have obtained enormous profits from the exploitation of the subsoil. It is impossible to calculate the amount; but it can be affirmed, on a conservative estimate, that the majority of the companies recovered their invested capital more than 10 years ago. The price curve of crude oil and its derivatives in recent months shows a steady rise, which indicates good prospects for the industries, at least during the next few years. The prices of articles of prime necessity which form the bulk of food requirements of a worker's family increased in the oil labor centers in 1937 in comparison with the averages of 1934 by 88.96 per cent.

"The actual salaries of the immense majority of oil workmen at the present time are lower than those which they earned in 1934 at least by 16 to 22 per cent. The actual salaries of North American workmen during the second quarter of 1937 were 7.84 per cent greater than those which they earned in 1934. The prices at which, according to the accounting of the oil companies, they sell their products, are invariably lower than the prices appearing in the oil journals which reflect the conditions of the market with precision. The prices at which the companies sell by-products in Mexico are considerably higher than the prices at which these same products are sold in foreign markets. . . . The percentage of profit in relation with the capital stock of the defendant oil companies (excepting Mexican Gulf, which did not permit examination of its accounts) has an average during 1934 to 1936 of 43.28 per cent. The percentage of profit in relation with the unamortized invested capital of defendant oil companies, excepting Mexican Gulf, had an average during 1934 to 1936 of 16.81 per cent. The principal oil companies in the United States during 1935 had a profit of 6.13 per cent in relation to their invested capital. Profits of all the oil companies in the United States in relation with their invested capital were in 1937 2.76 per cent; during 1932 there were losses instead of profits; during 1933 the profits represented 1.7 per cent; during 1934, 2.20 per cent, and in 1935, 1.44 per cent. The profit of the oil companies operating in Mexico are considerably higher than those operating in the United States. The capital invested in the petroleum industry in Mexico in 1935 hardly represented 0.73 per cent compared with the capital invested in the petroleum industry in the United States, whereas the oil production in Mexico represented 4.05 per cent compared with that of the United States. In 1935, an investment of 8.54 pesos was necessary to produce a barrel of crude oil against 48.12 pesos in the United States. The investment required in Mexico amounts to 17.96 per cent compared with that of the United States During the last three years the defendant companies have made large profits; their financial condition must be considered as being extraordinarily sound, and in consequence, it can be assured that during the next few years at least they will be able to accede to the demands of the Syndicate of Oil Workers up to an amount of approximately 26,000,000 pesos annually without hurting their present or future prospects."

After discussing the protests of the companies, the board announced it was in general upholding the report of the commission of experts and stated:

"From all of this it is found among other things that the profits made by the companies during 1934, 1935, and 1936 reached the amount of 68,668,394.23 pesos, according to the results of the balance sheets; but that, according to the commission of experts, these profits in reality reached.

(Continued on Page 62)

GEOLOGISTS FORM ILLINOIS COAL BASIN SOCIETY

Officers of the Western Kentucky Geological Society: Seated, N. W. Shiarella, of Miller & Shiarella, vice president; James Poteet, Kentucky Natural Gas Co., president; standing, Keith Miller, Carter Oil Co.; George Wesley, Snowden & McSweeney Co. and Cumberland Petroleum Co., members of the executive committee, and Ralph Knipe, Ohio Oil Co., secretary-treasurer

OWENSBORO, Ky., Dec. 27.—Thirty of the geologists at work in six Western Kentucky counties in the Illinois Coal Basin to determine the possibility of finding deep oil have organized the Western Kentucky Geological Society.

Officers elected at the December meeting in Owensboro are: James Poteet, Kentucky Natural Gas Co., president; N. W. Shiarella, Miller & Shiarella, vice president; Ralph Knipe, Ohio Oil Co., secretary-treasurer; W. Keith Miller, Carter Oil Co., and George H. Wesley, Snowden & McSweeney Co. and Cumberland Petroleum Co., members of the executive committee.

Deep drilling in Southern Illinois has spurred activity in leasing mineral rights under land in Daviess, Hopkins, Union, Henderson, Webster and Muhlenberg counties in recent months. Several of the larger operating companies have taken large blocks and are having geological and geophysical surveys made. When a drilling program will be undertaken has not been decided.

Bradford Producers Association Urges Refiner Cooperation

BRADFORD, Pa., Dec. 24.—The initial step toward a program of producer-refiner cooperation to bring stability and profitable prices to the Pennsylvania Grade crude industry was taken when the Bradford District Pennsylvania Oil Producers Association invited refiners to confer with producers in an effort to determine means to reverse the downward trend of Pennsylvania crude oil and refined products prices.

No date has been set for the proposed meeting but the association, largest district producers' organization in the Pennsylvania fields, reports the few refiners already contacted have indicated acceptance of the invitation. The association has named the following committee to represent it: A. E. Booth, W. N. Davis, D. T. Andrus, C. E. Streeter, R. S. Pringle, Jr., and J. C. Martin, executive secretary.

"The present situation is more drastic than at any previous time," the association stated. "Since September the Pennsylvania Grade crude oil market structure has suffered a reduction of 62 cents per barrel. The reduction implies a loss to the Bradford field of $30,000 per day or $900,000 per month, and to the whole Pennsylvania Grade area a loss of $50,000 per day or $1,500,000 a month.

"Crude oil in the Bradford field today is selling for $2.20 a barrel. This, however, is not sufficient to overcome rising operating costs such as are encountered in materials, increased compensation rates, replacements, etc.," the statement continues. "In fact the low market structure has made it difficult for producers to maintain their proper wage scales.

"There exists but 30 to 40 days' supply of available crude oil in stocks in the Pennsylvania area while the nation as a whole has approximately 90 days' supply of available crude stocks on hand. Curiosity has been expressed by many producers as to why the Pennsylvania grade situation is unstable while available crude stocks in days' supply are but half the national supply and yet the national structure is apparently in good position.

"Excess supplies of refined products, excess crude runs to stills and excess production have played their part in the situation. Some producers are wondering whether the answer to the betterment of the situation lies in state control of the industry," the statement resumed. "Others have expressed the opinion that cooperative action on the part of the refiners in reducing their excessive refined stock inventories and curtailing their crude runs to stills to meet demands for refined products and reduction of crude oil supplies on the part of produces is the answer to a stabilized condition.

"It has been stated however, that the producing industry can not continue to operate at the present low prices of crude in the face of the high costs of operation in the present and unquestionably higher costs in the future."

Dr. Frey Testifies He Warned Against Antitrust Violation

MADISON, Wis., Dec. 28.—A second meeting of the Petroleum Administration Board at which gasoline purchasing was discussed was described when the oil trial was resumed.

This meeting was held May 8, 1935. Dr. John W. Frey, testified on cross examination, and he declared C. E. Arnott was warned against activities in violation of the antitrust act.

Doctor Frey admitted he had no authority to tell Arnott to halt the buying program and the court struck out his statement that "if we had told him to stop buying I think he would have done so."

A legal battle resulted over the government's attempt to show Arnott was told that the "Ickes letter" did not give him authority for a buying program. The defense objected that the letter was not in evidence.

"Didn't you consider that you were calling Arnott on the carpet?" government counsel asked.

"If you want to put it that way Mr. Arnott was always on the carpet as far as we were concerned," Doctor Frey replied.

Shell Houston Refinery Reopened Following Labor Settlement

HOUSTON, Tex.—Shell Petroleum Corp.'s 75,000-bbl. refinery at Deer Park, located just outside of the Houston city limits, which has been shut down since November 19 due to labor troubles, was placed on full stream December 24. The employes overwhelmingly voted to return to work following an agreement between company officials and union officials earlier in the week. While details of the agreement were not announced, both sides stated that all details were satisfactory.

The refinery, employing 1,200 persons, had been shut down since the union walked off the job, charging that the company refused to negotiate with them for a 1938 contract. The company said at the time that it was unwilling to negotiate until negotiations with the C.I.O. union at the company refinery in East Chicago were completed. The plant shut down with the cooperation of the union, and the company made no effort to open it.

Secretary Ickes Grants Extension of Prospecting Permits for One Year

WASHINGTON, D. C.—Secretary Ickes has issued an order extending to December 31, 1938, all oil and gas prospecting permits outstanding on December 31, 1937. His decision was prompted by delays necessarily incident to making the factual determinations required under the act of 1937, and by his desire to grant an additional period to holders of permits with respect to which equities are claimed but which are not extended to December 31, 1939, by the 1937 act. The order does not deprive any permittee of the extension to December 31, 1939, granted by the act to those permits which fall within one or more of the five classes specified. Permits granted the 2-year extension by law are included in the general extension so that diligent compliance may be continued with assurance.

Permits which do not fall in one of the five classes in the act of 1937, cannot qualify for or become legally entitled to any extension beyond December 31, 1938. They are being extended only to that date to ripen their permits into leases under the act of 1920, or to exchange them for leases under the act of 1935.

Secretary Ickes emphatically declared the extension to December 31, 1938, and the 2-year extension to December 31, 1939, are the final years of the permit system and any permittee who fails to earn the right to a lease under the act of 1920, during the final period allowed him can continue prospecting work only if he secures a lease under the act of 1935, in exchange for his permit.

The extension order does not affect or revive oil and gas prospecting permits canceled by the department prior to December 31, 1937, or which have terminated at the end of their current term, or which have already been exchanged for leases.

Gain in Wildcatting Seen in California

By L. P. STOCKMAN

LOS ANGELES, Calif., Dec. 27.—Wildcat exploration and deep drilling in proved fields have become important factors in California during 1937 and will exert a pronounced affect on future production of crude, gas and natural gasoline. Drilling operations are far ahead of 1936 and it will be found the year will be the best from a drilling standpoint since 1930. Wildcat operations were undertaken on a broader scale and exceeded all previous efforts in scope of work and number of tests drilled. The aggressive exploration undertaken during 1937 will be expanded further and unless something unforseen develops wildcat drilling during 1938 will greatly surpass similar work this year. The possible results may be visualized to some extent in view of comparatively recent discoveries of primary importance in the Rio Bravo and Canal (Strand) areas of Kern County and possible impending discoveries in other districts where prospectors are drilling wildcats that show unusual promise. Wildcat operations during 1938 will include a number of wells drilled for the specific purpose of increasing reserves of dry natural gas which will eventually become a factor of economic importance on the Pacific Coast.

San Joaquin Valley, particularly the southern end of the basin in Kern County, has become the hottest spot in California from an exploratory standpoint and additional important discoveries are expected before the close of 1938 as this section contains the largest untested potentially productive acreage in the state. Most of this section of the basin will require deep drilling and use of geophysical methods as the fields are mostly out in the center of the valley and deeply buried. The map shows the center of wildcat exploration and important discoveries during the past two years. The existence of two parallel lines of folding have been postulated by the geological departments of several major companies. The existence of a probable line of folding southeastward from the Buttonwillow gas field to the Ten Section oil field was appreciated soon after Shell Oil Co. completed its discovery well in the Ten Section field. Shortly after discovery of the Ten Section field, Standard Oil Co. proved a new oil field at Greeley a few miles north of Shell's discovery and soon thereafter geologists recognized the probable existence of a second line of folding paralleling the original. The second parallel line of folding extends southeastward from the Semi-Tropic gas field to the Greeley oil field.

Interval of Sequence

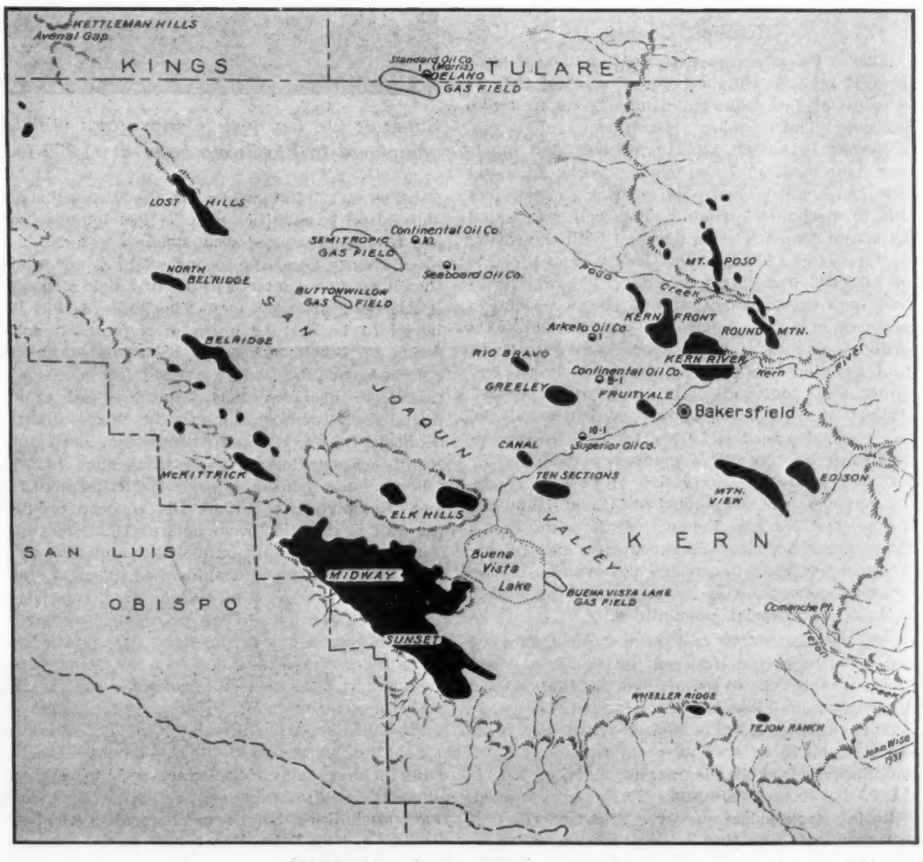
Oil fields located en echelon along well defined trends or sheer zones are a dominating characteristic of all three major oil producing basins in California. In the Los Angeles Basin the Inglewood, Dominguez, Rosecrans, Long Beach, Seal Beach, Potrero and Huntington Beach fields are located en echelon at regular intervals along the Newport-Beverly sheer zone and in Ventura Basin the Ventura Avenue, San Miguelito and Rincon fields are spaced along the major Ventura Avenue anticline. In San Joaquin Basin the Fruitvale and Mountain View fields are located along the Bear Mountain sheer zone as postulated by J. E. Eaton and in the northern section of the basin Kettleman Hills and Lost Hills show a similar axial trend and North and South Belridge fields like characteristics. As a rule these fields showing similar axial trends are out in the center of the respective basins in which they are located with additional productive oil fields along two or more rims.

The existence of oil fields along well-defined lines of folding or sheering in all three of California's major oil producing basins is of primary importance and gives a powerful stimulant to wildcat exploration because as soon as a new oil field is discovered prospectors immediately bisect the discovery well with a line having a northwest to southeast trend and drill at several points along the trend. After the interval of occurrence or sequence has been determined, which becomes evident upon discovery of a second field, tests are drilled along the probable line of folding or sheering at regular intervals. This practice has become general in exploratory work in California and operators acquire protective acreage along these trends even before drilling operations have been started. That the sequence factor of occurrence has been applied during the past year is evidenced by the fact that additional fields have already been discovered along the Buttonwillow gas field to Ten Section trend and along the parallel line of folding extending from the Semi-Tropic to Greeley oil field.

Rio Bravo Discovery

Approximately 3½ miles northwest of the Greeley field, Union Oil Co. has discovered an oil field at Rio Bravo while Superior Oil Co. is believed to have discovered a productive area about 3 miles southeast of the Greeley field. These two new fields are in a direct line with Semi-Tropic gas field and the Greeley field discovered by Standard Oil Co. following discovery of the Ten Section oil field by Shell and their discovery might have been retarded for several years if Shell had not discovered Ten Section field when it did. Along trend southeasterly from the Buttonwillow gas field to Ten Section oil field, Ohio Oil Co. has within the past month discovered an oil field in the Strand area about 3 miles northwest of Shell's discovery well at Ten Section. Ohio Oil Co. has decided to designate its discovery as the Canal field. It appears almost certain additional productive fields will be discovered along both these lines of folding. Prospectors are gradually working northwestward from production in the Greeley and Ten Section fields and Standard Oil Co. is drilling a deep test on the Randolph Community lease in the Semi-Tropic gas field to determine the possibility of developing commercial oil production below the productive dry gas zone. The outcome of this deep test which is at 8,050 feet will greatly affect future exploration work along this trend and may stimulate deep drilling in the Buttonwillow gas field which appears to show as favorable prospects for deep production of crude.

The several commercial gas fields discovered



California area attracting attention

in the San Francisco Bay region in Solano and San Joaquin counties have greatly stimulated interest in the search for additional accumulations and additional wildcats will be drilled during the coming year after geophysical surveys. The Rio Vista gas field in Solano County which has been consistently extended eastward has reached the southwestern city limits of Rio Vista and preparations are under way to develop this town lot acreage unless restrictions are imposed. In addition to acquiring leases within the townsite, Standard Oil Co., Superior Oil Co., Amerada Petroleum Corp. and Texas Co. have acquired acreage across the Sacramento River in Sacramento County. Standard Oil Co., which has pursued an aggressive policy in its search for commercial gas fields, has completed a geophysical survey between the Sacramento and Feather rivers about 10 miles northeast of Woodland, and another seismograph survey in the vicinity of Fairfield Knolls several miles southeast of Woodland. A short distance southeast of Fairfield Knolls, Union Oil Co. has run a geophysical test and may undertake wildcat exploration in 1938 if the survey looks favorable.

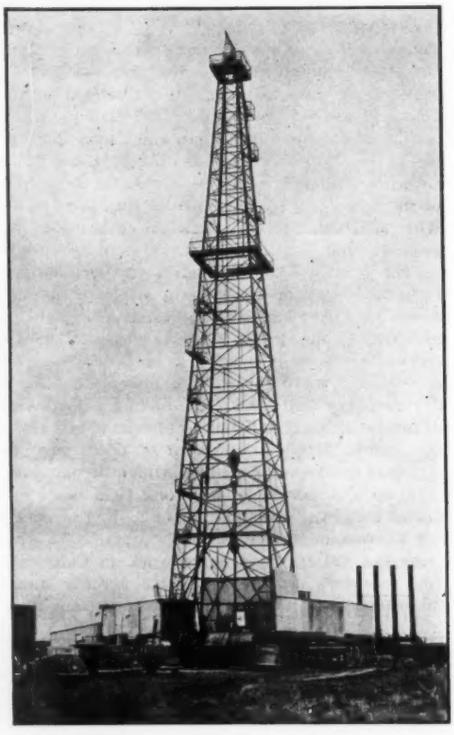
In Santa Cruz County, Fullerton Oil Co. after making a geophysical survey has completed a leasing campaign a few miles southeast of Watsonville but will not do any drilling until early next year. In Sutter County, Buttes Oilfields Co. has finished deepening its No. 3 to 6,322 feet and will make an early production test for gas. This company's No. 4 was completed several months ago flowing approximately 15,000,000 feet of dry gas from 5,850 feet and the company hopes to duplicate it with No. 3. This is a complex geological structure and it may require additional development to prove or disprove the commercial possibilities and no pipe line has yet been provided. Buttes Oilfields is using a little gas from No. 4 under the boilers while working on No. 3 but with this exception No. 4 has been standing shut in since completion. It shows a casing pressure of 3,200 pounds.

Humbolt County

Texas Co. is expected to drill another wildcat near Eureka in Humbolt County during 1938 as a result of favorable indications in its first two wildcats. The company's latest test well is No. 2 Eureka in section 22-3-1 at present shut in. It was bottomed at 7,708 feet in rocks of basal Pliocene but has been plugged back to 5,800 feet due to mechanical trouble. The well was tested by stages a month or so ago and with the casing perforated at 4,010-4,060 feet it flowed at the rate of 5,000,000 feet of gas per day. The well is in bad mechanical condition but shows a shut-in pressure of 2,250 pounds and justifies additional drilling. The gas contains a small amount of natural gasoline but the well has not shown any unusual oil indications. In the Half Moon Bay district of San Mateo County, Wilshire Oil Co. has reached 4,500 feet in No. 1 Cowell in section 20-6-5 but has not yet encountered the pay. In contrast with this aggressive wildcat work in the northern counties comprising Glenn, Humbolt, Solano, San Joaquin, Sonoma, Sacramento, Santa Cruz, Sutter and Stanislaus counties, major companies a few years ago would not even authorize reconnaissance work as the area was not believed to have commercial possibilities.

The Cantua district of Fresno County, another area which was considered unfavorable until Western Gulf Oil Co. found favorable indications in two of four wildcats, will see additional prospecting during 1938. Union Oil Co. has just spudded in No. 1 Nicholson in section 17-15-15 and Superior Oil Co. is making hole in No. 1 C.U.P. in section 20-16-13. Both were started following geophysical surveys. Standard Oil Co. has completed shooting several sections with a seismograph and will drill a deep test if the survey looks interesting. This is the second time Standard Oil Co. has had geophysical parties in the area. Western Gulf Oil Co., pioneer prospector in this district has announced intention of additional exploration in the Cantua district and location has been staked for No. 4 S. P. in section 3-17-15.

Continental Oil Co. is working on two wildcats in Kern County that have shown more than ordinary promise but additional drilling may be required before the possibilities are determined. These wildcats are No. 2-A Kern County Land at Wasco in section 8-27-24 and No. 1-B Kern County Land in the Rosedale district in section 12-29-26.



Superior Oil Co. test in Rio Bravo will be completed in Rio Bravo sand at 11,300 feet

Continental's initial wildcat in the Wasco district showed oil possibilities at 9,591 feet but mechanical trouble prevented a satisfactory test. No. 2-A Kern County Land the second well has not found the oil sand encountered in the first hole although it has reached 11,583 feet. The latter well is believed to be east or north of a fault. A solid string of 7-inch casing has been landed in No. 2-A Kern County Land at 11,570 feet to keep a fish from dropping back. Southeast of Continental's wildcat operations in the Wasco district Seaboard Oil Co. is expected to resume deepening No. 1-C Kern County Land in section 26-27-24 following a suspension of several months at 10,243 feet. Completion of Union Oil Co. deep producing well in the Rio Bravo field at 11,302 feet has completely changed the outlook although Seaboard Oil Corp. Wasco wildcat looked deep a few months ago it is now only a matter of relativity.

General Petroleum Corp. is drilling a wildcat about midway between the North and South Belridge fields in Kern County on a seismograph high but at 5,150 feet still has some distance to go before encountering the pay. General Petroleum has not shown any interest in deep zone possibilities in the South Belridge field where it drilled a deep test several years ago but may reenter this field as this deep well showed production possibilities before mechanical difficulties developed. The Tejon Ranch area in the extreme southern end of San Joaquin Basin in Kern County is again undergoing exploration. This area has shown favorable indications from time to time but none of the operators who have drilled tests have been able to find a commercially productive zone. Honolulu Oil Corp., Ohio Oil Co. and Universal Oil Consolidated Co. are drilling in this area and one hole may bear watching. This is Universal Consolidated No. 1 in section 33-11-19 which has logged an oil sand at 4,440 feet and after being drilled to 4,448 feet is standing cemented with an 8⅝-inch water string on bottom. Ohio Oil Co. in section 23-11-19 is coring in No. 2-D at 4,260 feet while Honolulu is drilling No. 33-1 S. P. in section 33-12-19 at 4,450 feet. Wildcat exploration in southern California and principally Los Angeles Basin is showing an increase after several years of minimum drilling but no great gain is expected. Shell Oil Co. appears to have discovered a productive area out in the Yorba Linda area but decision awaits development. In the Montebello field St. Helens Petroleum Co. has cored into a Miocene oil sand showing good promise but it is within the confines of the original field. It will result in deepening operations in the extreme western end of the structure if large production is found.

WASHINGTON

(Continued from Page 59)

particularly for the purpose to which the examination was dedicated, or that of judging the economic situation of these companies during the next two years, a total of 168,783,529.37 pesos, also in accordance with data of the accounting books, but by means of a series of adjustments, made for several reasons and included in the accounting by the commission of experts as a result of their having been used as manipulations by the defendant companies, these being either of a commercial or of an accounting nature, there exists a transference and there also exists a hiding of profits, and there are also indications that some of the disbursements are of an extraordinary nature which though effected during the three-year period of this examination, they would not be necessary for the industrial operation of the next two years. The commission of experts concludes that the average profit for each of those three years amounts to 56,261,176.46 pesos, and the commission calculates these are the profits for each year during the next two years, that is to say, during the time which it considers that the collective contracts would be in force."

The board's report says: "The adjustments made in the accounts of the companies because of differences in the export prices reach a total of 43,217,565.16 pesos during the three-year period. . . . These adjustments are based by the experts' commission on the fact that the companies sold their products at export prices lower than world quotations, using this reduction in price as a means of transferring profits, for which reason the difference between said prices and prices fixed by world quotations constitute a part of the profits of the companies. On their part, the companies deny that such prices may be considered as lower than world quotations, stating that they are not."

OBITUARY

DEVERNE VENSEL, 62, veteran Tulsa oil operator, died December 26. He was born in Monroeville, Pa., in 1875, and entered the oil business when 17, following the trend through Pennsylvania, Ohio, Indiana, Kansas and Oklahoma. He moved to Tulsa in 1904 as manager of the National Supply Co., retiring from association with the company after 16 years when he engaged as an independent producer with P. E. Elliott at Bird Creek and other sections of the state.

Deeper Structure at Benavides Extending Trend Play

By F. L. SINGLETON

Water for drilling is pumped to locations by small gasoline engines

CORPUS CHRISTI, Tex., Dec. 27. Operators in Southwest Texas are watching the rapidly spreading development in the Benavides field, east central Duval County, which within a few months has become the most active and is now recognized as one of the most important discoveries in the district.

The significant feature is that it opens a new type of structure in the district and is the first important deep production in Duval County. It encourages deeper exploration throughout the Laredo district, which has been confined largely to shallow shoreline structures in which production has been opened from 250 to 3,500 feet. Its development has resulted in an extensive trend play expected to disclose additional crude reserves.

Benavides was discovered as a result of a general wildcat drilling campaign following discovery of the Sweden field, 4½ miles southwest, opened in February by Hiawatha Oil & Gas Co. No .1 Southland Life Insurance Co., the first deep production from the Cockfield horizon.

Three Highs

Previous to Sweden discovery, Hiawatha Oil & Gas Co. (Benedum & Trees) worked the area with reflection seismograph and found three "highs" which resulted in approximately 21,000 acres leased. Two dry holes were drilled, one being only 3,500 feet southeast of the southern portion of the Benavides field and the other about 7 miles southwest of Benavides production. The discovery well of the Sweden field was 3 miles south of Benavides field and the structures are believed to be associated, although there is little possibility they will be joined.

The discovery well at Benavides was strictly a wildcat venture, being along the same trend about 4½ miles northeast of Sweden on the Puig 300-acre lease, and was drilled by Frank Gravis of San Antonio. The well was completed April 17 at 4,768 feet for 440 bbls. per 48 hours through a quarter-inch choke with tubing pressure 750 pounds and casing pressure 550 pounds.

Since completion of the discovery, four additional sands have been found which have extended the field over an area 3 miles in width and about the same distance in length, approximately 6,000 acres. With the exception of one dry hole on the extreme northeast side which may or may not define production, the balance is undefined.

The producing sands are the Gravis, Parr, Woodley, Cockfield and a 3,900-foot sand at 3,885-3,923 feet, called by some the Cole sand. No wells have been completed in the Cole sand, but a series of drill-stem tests have proved oil and gas accumulation in commercial quantities. Actual testing will probably be delayed until the deeper sands become depleted. The Woodley, Parr and Gravis sands are encountered from 300 to 400 feet below top of the Hockleyensis zone in the Jackson formation. The 5,300-foot sand has been identified as the Upper Cockfield.

The Parr sand was opened by Standard Oil Co. of Kansas No. 1 Parr, 5,800 feet south of the discovery well, with the sand found about 55 feet higher than the discovery. This well was completed at 4,748 feet for 268 bbls. through a three-eighths inch choke with tubing pressure 450 pounds and casing pressure 710 pounds.

The first Cockfield production was opened by Navarro Oil Co. No. 1 Rossi, 6,500 feet southwest of the discovery. It was completed for 120 bbls. per day through a five-thirty-seconds inch choke. No sands were encountered in the Hockleyensis zone.

About 5,000 feet east of the discovery, Woodley Petroleum Co. No. 1 Vaello was drilled to the Yegua at 6,007 feet and completed in a new sand at 4,798-4,811 feet. This sand is approximately 130 feet above the Gravis sand, which carried salt water as did the Parr sand and the sands in the Cockfield section.

The 3,900-foot sand was first tested in Standard Oil Co. of Kansas No. 2 Walsted, on the west side of the field. It was shown on a Schlumberger survey and on a drill stem test showed oil and gas in commercial quantities, but was completed in the discovery pay. This section is known to be present in practically all wells drilled to the Gravis and Parr sands.

Production from the Cockfield was recently extended 5,600 feet northwest by Bob Blanchard No. 1 Puig. It was completed on gas-lift at a plugged back depth of 5,408 feet for an initial of 80 bbls. of oil per day with 10 per cent salt water. It is approximately 70 feet structurally lower than the Navarro Oil Co. No. 1 Rossi, southeast.

Shallow Anticline

Benavides is believed to be on a shallow anticline with production from the Gravis, Parr, Woodley and 3,900-foot sands governed by a progressive lensing out of these sands toward the west flank. Production from the Upper Cockfield section is probably related to the structure itself and will be confined to the west.

At a recent date there were 103 producing wells having a daily production under proration of approximately 5,300 bbls. Of this number 4 are producing from the Upper Cockfield, 3 from the Woodley sand on the extreme east side, 19 oil wells and 1 gas well from the Parr sand and 73 oil wells and 3 gas wells from the Gravis sand.

The water level of the Gravis sand has been determined at approximately minus 4,415 feet. The water level of the Parr sand will probably approximate the water level of the Gravis sand. The maximum thickness of the Gravis sand is 28 feet while the Parr averages 20 feet. The gas cap of the Gravis sand has been determined at minus 4,360 feet while the Parr sand carries very little gas. The water level of the Woodley sand is at minus 4,410 feet. The 3,900-foot sand has a gas cap at minus 3,488 feet; water level at 3,498 feet.

The deposition of the 3,900-foot, Gravis and Parr sands is believed to offer a perfect condition for "twin drilling" and several operators have completed or started such tests. Gravis and Doran have completed twin wells on their Vaello lease as well as Navarro Oil Co. on the R. V. Owens lease, while Standard of Kansas is twin drilling its Atlee Parr

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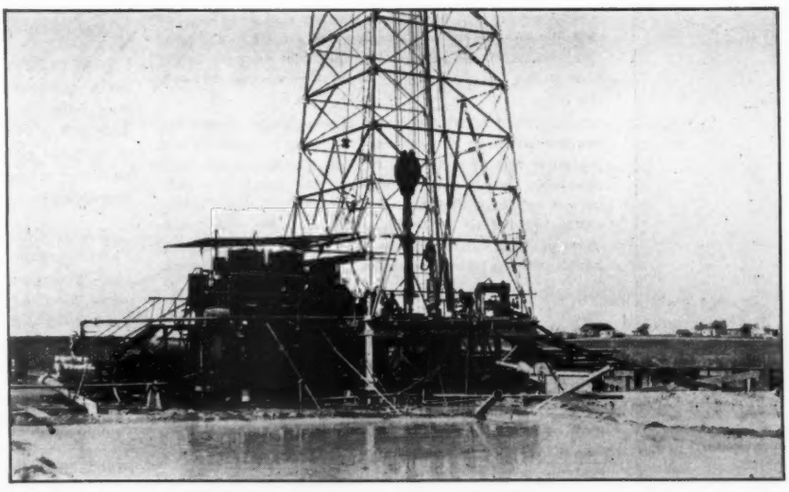


Diesel rig in Benavides field

Bureau Estimate of January Motor Fuel and Crude Demand

The daily average supply of domestic crude oil estimated by the Bureau of Mines to meet the demand in January is 3,406,800 bbls., or 84,500 bbls. less than for December, but 227,200 bbls (7 per cent) higher than for January, 1937, and 6 per cent higher than the actual demand for that month. Production during the five weeks October 30 to December 4 averaged about 3,497,000 bbls. daily. Crude stocks declined 4,106,000 bbls., net, including an increase of 414,000 bbls. in foreign stocks, or a total decline of 4,520,000 bbls. in domestic. This indicates a demand for domestic crude of 3,626,000 bbls. daily. However, at least 100,000 bbls. of this apparent daily demand represents the crude runs equivalent to a gasoline stock increase in November that was about 1,400,000 bbls. greater than for November 1936.

Motor Fuel.—The estimate for domestic motor fuel demand for January is 36,500,000 bbls., or 8 per cent higher than the apparent demand for January, 1937, and about 5 per cent over the estimated normal demand for January 1937.

Motor fuel exports have been estimated at 3,800,000 bbls.

Stocks of finished and unfinished gasoline amounted to 68,037,000 bbls. on October 31. Gasoline stocks increased about 2,500,000 bbls. during November to approximately 70,500,000 bbls., or about 11,700,000 bbls. higher than November 30, 1936, representing an increase from 44 days' supply to 50 days' supply. Even though such stocks may be excessive the bureau anticipates refiners will increase their finished gasoline stocks by at least 5,900,000 bbls. during January, compared with an actual increase of 8,000,000 bbls. in January 1937. The estimated increase in gasoline stocks for January, reflecting chiefly the rapid growth in heating-oil demand, might be reduced by increasing the distillate yield. This might be effected by a further diversion of cracking stock to distillate production and by cracking residuals. The bureau wishes to emphasize it is not recommending the above increase in stocks but merely forecasting what may occur in the light of present conditions and past experience.

Benzol and "direct" sales and losses of natural gasoline have been estimated as 800,000 bbls., making the estimated production of gasoline 45,400,000 bbls., or 1,465,000 bbls. daily. This is distributed among the various districts as follows (thousands of barrels): East Coast, 6,400; Appalachian, 1,530; Indiana-Illinois, 7,760; Oklahoma, 2,960; Kansas-Missouri, 2,550; Texas Inland, 3,630; Texas Gulf, 10,420; Louisiana Gulf, 1,380; North Louisiana-Arkansas, 900; Rocky Mountain, 1,100; California, 6,770.

Runs to Stills.—Natural gasoline consumption at refineries in December is estimated as 6.8 per cent of the total gasoline required, or 3,090,000 bbls. The yield of straight-run and cracked gasoline is estimated as 43.0 per cent, or slightly lower than for January 1937. Application of this yield to the estimated straight-run and cracked gasoline production of 42,310,000 bbls. gives refinery crude oil requirements as 98,310,000 bbls. daily.

Foreign crude run to stills is estimated as 2,300,000 bbls., or 10,000 bbls. less than the December estimate.

Crude oil exports have been estimated at 6,000,000 bbls. The estimate for crude oil burned as fuel and losses has been reduced to 3,600,000 bbls.

ESTIMATED CRUDE OIL REQUIREMENTS BY STATES

(Daily averages in barrels)

State—	Forecast January 1938	Forecast December 1937	Actual production October 1937
Texas	1,350,900	1,399,800	1,445,700
California	678,300	679,400	694,500
Oklahoma	566,600	588,800	598,500
Louisiana	238,400	244,000	245,200
Kansas	179,300	186,000	193,600
New Mexico	103,100	104,100	106,400
Wyoming	55,500	57,100	50,900
Michigan	54,100	51,800	53,500
Pennsylvania	51,000	51,000	53,300
Arkansas	35,200	33,900	40,600
Illinois	27,400	24,400	29,400
Montana	13,100	15,800	12,700
Kentucky	14,300	14,500	14,100
New York	13,900	14,300	14,300
Ohio	9,500	9,900	8,500
West Virginia	9,600	9,800	10,500
Colorado	4,300	4,400	3,900
Indiana	2,300	2,300	2,200
Total	3,406,800	3,491,300	3,577,800

Derrick Disappears in Crater in El Segundo Field, California

Richfield Oil Corp. No. 1-B Santa Fe, in the north end of El Segundo field, California, as it appeared while high-pressure gas was cratering around the surface string of casing. This is the third deep hole lost in the field due to blowouts from the shallow gas horizon. A few hours after this picture was made the derrick, with most of the rotary drilling equipment attached, subsided into the crater and due to the mud and gas which continued to roar from the hole, only the uppermost parts of the derrick could be seen.

The troublesome gas zone was found in this well at approximately 2,000 feet, after the surface casing had been set at 1,200 feet. The hole was drilled to 7,539 feet without additional casing and plugged back to 7,425 feet. The blowout occurred when drill pipe was being withdrawn preparatory to making a drill stem test. After the workers were out of danger, the gas and sand cut the drill pipe at the surface, dropping 60 stands in the hole. The sand and gas also cut through the surface casing so that gas was soon coming around, as well as through, the pipe.

About six hours after this occurred, the crater had become so large the derrick fell into it. Loss to the company was estimated at $75,000. The gas is not merchantable, being marsh gas, and the company's only course was to wait for the gas to become sealed off or exhausted before beginning salvage work. Vast quantities of sand and mud were discharged from the hole, which rolled glacier-like down grade from the location.

Colonel Thompson Comments On Oil Industry Position

AUSTIN, Tex., Dec. 28.—Railroad Commissioner Ernest O. Thompson, chairman of the Interstate Oil Compact, in a statement said: "Conservation and proration has benefited the nation by developing huge reserves of oil and gas to be used as needed."

"The Texas law," he said, "requires the Railroad Commission to keep in mind purchasers and consumers of gasoline and lubricants. Gasoline is today the biggest bargain on the American market, not counting taxes. They said if you will look after the consumer, the consumer will look after you. By this token, the oil business finds itself in a most prosperous condition, almost approaching the peak of 1929 prosperity."

He extended wishes for the industry for a prosperous year, "which I believe can be had unless the industry drills itself unnecessarily into bankruptcy.

"I notice on the part of some of the larger companies a disposition to drill heavily on inside locations. This certainly cannot be laid to the other fellow or to proration, I cannot understand it; but it is not the function of the regulatory authorities to see to it that the industry is prosperous. If people want to drill wells that will not make a profit, that is their business."

Texas Hearing on January 17; Louisiana-Arkansas Orders

AUSTIN, Tex.—The Texas Railroad Commission will hold the next state-wide oil proration hearing January 17. It will consider how much production should be reduced to keep gasoline stocks from piling up in late January and February.

The basic allowable for the first half of January is 1,357,573 bbls. daily. It may reach 1,400,000 bbls. January 17, due to completions.

Louisiana Allowable

NEW ORLEANS—The monthly proration order by the Louisiana State Conservation Department, minerals division, provided the same allowable production for North Louisiana in January as in November and December but permitted an increase of more than 2,000 bbls. daily in South Louisiana.

The South Louisiana production was placed at 173,500 bbls. for January compared with 171,475 in December. North Louisiana was allotted a quota of 82,500 bbls. daily, or a grand total of 256,000 bbls. daily for the state.

Arkansas Order

EL DORADO, Ark.—The Arkansas State Board of Conservation has announced daily production allowables for the Miller County, Arkansas, extension of the Rodessa field and for wells producing from Jones sand in the Schuler field near El Dorado, the first allocation for Arkansas fields.

January daily production for Miller County was set at 10,329 bbls. from 57 wells, and January production for Schuler fixed at 3,933 bbls. from 10 wells in the Jones sand.

THE MARKETS*

CRUDE OIL: *Notwithstanding a further rise in production, the crude market is regarded as moving into a better statistical position. Production last July was 22 per cent higher than in July, 1936. This month it is about 9 per cent higher than in December, 1936. The first schedule of prices for the Greeley and Canal fields in Kern County, California, was posted.*

REFINERY: *Dullness pervades the market in most products other than light fuels and natural gasoline. Heavy fuels continue to feel the recession in industry. Although headway has been made in the Mid-Continent area in the effort to stop the piling up of threatening stocks of motor fuel, the national situation is not encouraging.*

TANK-WAGON AND POSTED DEALER: *Socony-Vacuum reduced tankcar consumer prices one-half cent throughout its territory. Standard of California made local adjustments, the first changes in many months. Standard of Ohio reduced tank-wagon and service station gasoline one-half cent.*

FINANCIAL: *Oil shares moved within a narrow range, ending the week with a moderate rally. Average of 30 stocks for week ending December 24: Hight, 29.45; low, 27.97; close, 28.49. Week ending December 18: Hight, 28.86; low, 26.97; close, 28.52.*

**Detailed information in Market Section.*

The OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

Published weekly by The Petroleum Publishing Company at Tulsa, Oklahoma

Despite Difficulties

This International Issue of The Oil and Gas Journal emphasizes the increasing hold that petroleum products have obtained upon consumers in all parts of the world. They have become a universal necessity in industrial expansion, for national defense and an improved standard of living.

The year just drawing to a close has witnessed the largest gain in petroleum production and demand in history. The gains in demand have not been confined to any one country or continent. This year's increase was equal to the total demand early in the century.

Great as this growth of the industry has been, any study of conditions reveals that it has been accomplished despite tremendous obstacles, not only in finding raw materials, but in the distribution of the finished products.

Remarkable as these gains have been they can be dwarfed within the next 25 years provided governments do not throw up additional barricades in the form of taxation, restrictions and regulations.

Just why any nation should place such restraints upon consumers of products which have contributed so largely to the advancement of progressive peoples in the past 25 years passes understanding. But that is what is taking place.

This is a particularly backward phase of extreme nationalism. We know we have no substitute anywhere comparable to the products of petroleum. While development of substitutes may be justified as reserves 50 or 100 years hence, currently the cost of their production is so far out of line with petroleum products there can be no comparison, while the substitutes are generally inferior in quality. The price is usually two to several times as much.

The policy of self-sufficiency, forced on many countries by the economic and financial disruption following the war, has since been promoted by the fear of war and the necessity for defense. The vital importance of oil in modern warfare has stimulated efforts to secure national reserves, either by expansion of refining or through development of substitutes.

But at the same time these governments have adopted a policy of discriminatory taxation and restrictive regulation upon the normal use of petroleum in their countries on the supposition that they are thereby promoting the development of substitute fuels. Actually they are depriving their people of the most effective agency for national growth.

Notwithstanding this, the industry has had this amazing increase in supply and demand, exceeding all predictions, doubling consumption within 13 years and trebling it in less than 20 years with a greater percentage of gain this year than ever before.

The phenomenal thing is that this has been accomplished despite governmental handicaps and imposts not only on petroleum but upon vehicles using it.

This reflects the essential value consumers have come to place upon petroleum products, as shown in the expanding use of diesel engines in industry, and of burning oils which have shown a gain as outstanding as the increase in motor fuels for transportation.

The firm position occupied by the oil industry was demonstrated during the prolonged depression when it was the only major industry to expand.

It should be apparent to everyone, including even the most dogmatic rulers, that this nationalistic policy, so far as the oil industry is concerned, is likely to result in disaster to the country which continues it indefinitely.

How much better would it be to reverse the present policy and encourage development of normal trade practices to bring in a supply at lowest possible prices.

Natural Gas News

Dr. J. B. Garner Warns Pittsburgh Of Potential Hazard in Gas

PITTSBURGH, Pa.—Dr. J. B. Garner of Mellon Institute says Pittsburgh is located on a natural gas dome, water wells frequently bringing gas, potentially dangerous. In suburban Allison Park there are wells that spit fire if a match is touched to the pump spout, he said. In this section the state department of labor ordered the Hampton Township school closed because of fears an explosion such as that which destroyed the New London, Tex., school might occur.

Dr. Garner, who investigated conditions at the school, notified Principal Cyril C. Sarver:

"The presence of gas in your water supply and the presence of gas coming from lower strata outside the casing of the abandoned well in the school yard constitute a hazard to your school building unless provision is made to eliminate this condition."

He recommended the school water tank be removed from the basement to the roof and that chimneys be erected on each of the gas heaters. He said a similar hazard was recently discovered at a Pittsburgh hospital, but he had recommended alterations that eliminated the condition.

Dr. Garner is director of a utilities survey commission financed by the city's public utilities companies, and with his staff of 27 makes periodic inspections of gas facilities of every school, church and public building in the city.

Gas-Purifying Plants for Two Canadian Cities

KINGSVILLE, Ontario.—Arrangements are being completed whereby the Southern Ontario Gas Co. will supply purified gas for Kingsville. Bon Jasperson is erecting a small purifying plant, utilizing the lime solution process, to handle the production of local wells, which will be supplemented by gas treated at the company's main purification plant at Glenwood.

The new purification plant of the Central Pipe Line Co., at Springfield, Ont., has been completed and is in operation. The plant, employing the lime solution process, is in three units with an aggregate capacity of 5,000,000 cubic feet a day and provision for adding three additional units when required. Gas from the company's wells in the Brownsville field will be treated.

Bow Island Gas Rate Is Now Lowest Rate in Canada

BOW ISLAND, Alberta.—The Bow Island town council has authorized a prompt payment discount on natural gas bills of 20 per cent, making the net rate 24 cents per 1,000 feet, believed the lowest gas rate in Canada. The town is supplied from a municipally owned well.

Texas Commission to Hold Hearing on Gas Rates

AUSTIN, Tex.—The Texas Railroad Commission will hold a hearing at Olney January 4 on gas rates charged by City Gas Co. in seven West Texas towns where the city councils had asked the commission to audit the records of the company to determine whether existing gas rates are too high. The towns are: Olney, Archer City, Megargel, Holliday, Clarendon, Lelia Lake and Hedley. Existing rates in Clarendon, 70 cents; Hedley and Lelia Lake, 80 cents; Archer City, Holliday, Megarel and Olney, a step rate from 75 cents downward.

The commission recently issued a notice to City Gas Co. to produce its books and records for inspection, threatening to seek to force the company into receivership if the records were not produced. The company lists Mineral Wells as its Texas headquarters, but Texas officials stated all records are kept in Mount Vernon, Ohio, and no copies are available in Texas.

Since the Texas supreme court upheld the rates fixed by the commission in the Lone Star Gas case, the commission has twice used the concurrent original jurisdiction procedure. The first use was in the West Texas Gas Co. case when the commission fixed the rate of 50 cents for Lubbock and 42 other towns. In the Southwest Gas Co. case the rates of Cuero and six other towns were lowered. In both cases the average rate reduction was 17 per cent, and the gas companies have accepted the new rates without protest.

Formerly the commission exercised only appelate jurisdiction in gas cases, except in towns having a population of less than 2,000.

Refinery Projects

Harry W. Kaley Is Promoted By Ethyl Gasoline Corp.

Harry W. Kaley, for 11 years a member of the sales department of Ethyl Gasoline Corp., has been appointed general sales manager, according to an announcement

Blackstone Studios

HARRY W. KALEY

made by Earle W. Webb, president of that company. In recent years Mr. Kaley has held positions as advertising manager and assistant sales manager. His new appointment becomes effective January 1, 1938.

Canadian Gasoline Imports Increased in September

OTTAWA, Ontario.—Imports of natural casinghead, compression or absorption gasoline lighter than .6690 gravity into Canada in September totaled 6,345,224 gallons valued at $407,956, all from the United States; compared with 3,656,536 gallons worth $248,412 in August, of which 1,086,989 gallons came from the United States.

Imports of gasoline lighter than .8235 specific gravity in September amounted to 5,100,649 gallons worth $437,998, of which all except 115,000 gallons worth $7,900 came from the United States. August imports were 3,411,358 gallons, worth $306,578 of which all except 245,000 gallons, worth $16,830, came from the United States. Exports of gasoline and naphtha from Canada in September totaled 69,007 gallons, worth $7,736, compared with 616,364 gallons, worth $50,365, in August.

The upward trend of gasoline consumption continued in September in the eastern provinces, including Manitoba, all showing increases. Saskatchewan, Alberta and British Columbia showed declines compared with the same month last year. All the provinces show increases for the nine months of 1937 over the like period of 1936.

North Star Plant to Operate On Turner Valley Crude

WINNIPEG, Manitoba.—North Star Oil, Ltd., operating a refinery of 1,600-bbl. capacity here, is planning to run entirely on Turner Valley crude, commencing in January. Imperial Oil, Ltd., will extend its marketing of products of Alberta crude into Manitoba and the western section of Northern Ontario early in 1938.

BENAVIDES

(Continued from Page 63)

lease. The wells are about 50 feet from the original well which will provide two wells to each 10 acres, should all leases be twin drilled. Although no spacing program has been designated, the Cockfield area will probably be drilled on a 20-acre spacing basis.

The lone dry hole was drilled by Sun Oil Co. on the F. S. Barton lease on the extreme northeast side offsetting Parr and Delaney Oil Co. Vaello lease. The Cockfield was topped at 5,450 feet and it was abandoned at 5,671 feet after testing salt water. This test is 150 feet lower than Navarro Oil Co. No. 1 Rossi, the nearest Cockfield producer This places a fault within this area, although its direction has not been determined.

There are two outpost tests that have attracted attention. On the east side, about 3,000 feet northeast of Woodley Petroleum Co. No. 1 Vaello, Frank Gravis No. 1 Vaello cored sand showing oil and gas at 4,897-4,906 feet and a drill stem test was being made. On the west side, Cockfield sand showing oil and gas was cored in Circle Oil Co. No. 1 West from 5,342-57 feet and a production test was scheduled to be made after 7-inch casing was cemented at 5,342 feet. This test is 3,000 feet south of Navarro Oil Co. No. 1 Rossi and approximately 3,500 feet west of production from the southern part of the field.

Drilling operations offer few problems. Drilling is comparatively easy with the average time for a completed well from 14 to 18 days. Surface pipe of 10¾-inch is cemented from 500 to 600 feet with 250 sacks of cement while the production string is usually 7-inch and is cemented with 500 to 600 sacks. The production string is usually cemented on top of the sand, although several operators cement on bottom and complete through perforations. The wells are washed with clear water or oil and are brought in through various chokes ranging from an eighth- to a quarter-inch. The average surface pressures on the casing and tubing ranges from 400 to 1,600 pounds on the casing and from 700 to 1,700 pounds on the tubing. Diesel and steam powered rigs are used.

At a recent date there were 16 rigs running which are operated by Frank Gravis, Gravis and Doran, Hiawatha Oil & Gas Co., Benedum & Trees, Bridwell Oil Co., Russ Petroleum Co., Standard Oil Co. of Kansas, Navarro Oil Co., Woodley Petroleum Co., Parr and Delaney Oil Co. and Reynosa Oil Co.

Pipe line facilities are offered by Duval Pipe Line Co. 68-mile, 6-inch line to its terminal at Corpus Christi, Humble Oil & Refining Co. 4-inch feeder line that ties into its main line which extends to Harbor Island near Corpus Christi and Gravis Pipe Line Co. short line which extends to a loading racks at Benavides, about 2 miles north of the field.

Pipe Line Activity

Pipe Line Constructed for Fort Norman, N.W. Territory

FORT NORMAN, Northwest Territory.—The past season saw the completion of improved facilities in the Canadian North for marketing petroleum products from the Fort Norman refinery of Imperial Oil, Ltd., to the mining area of Great Bear Lake. Refining operations at the Fort Norman wells have been carried on every summer for several years by Ronald W. McKinnon and a small staff.

Last year it was decided to provide a tank barge-pipe line system north and south on the Mackenzie and east to Bear Lake that would reach every major mining area. This involved construction of tank barges for the Mackenzie and Slave Lake run, the building of steel tanks for barges already in service on the Bear River, and the laying of a pipe line with storage tanks on the Bear River portage.

As the work had to be done in the short northern summer, elaborate detailed preliminary planning was involved. Crews of pipe layers and tank builders were recruited largely from Turner Valley. Weeks before the arrival of the first river boat at Fort Norman, advance crews were clearing the line through muskeg and over hills in preparation for the first pipe, building tank foundations and preparing pumping early in July, and until late August work went on continuously. In that period 9 miles of pipe were laid, two pumps set up, with two sectional storage tanks at the rapids and larger tanks at Fort Franklin and Eldorado. Tanks were also set up at the wells, 55 miles below Fort Norman. The work of tank building and pipe laying was made more difficult by the millions of mosquitos and flies swarming in the North at that season.

Under the new arrangement oil is carried in tank barges from the refinery, 55 miles below Fort Norman, to the foot of the Bear River rapids, and pumped through the pipe line across the portage, and thence carried in barges to its destinations. Provision is made for ample storage at strategic points.

Survey for Lisbon Field Line To Be Started Next Week

SHREVEPORT, La.—Work of surveying a right of way for Clyde Barbour and Gil Woods proposed 28-mile 6-inch line from the Lisbon field to the Louisiana & Arkansas Railroad near Minden, Webster Parish, will be started next week. Barbour & Woods have announced they will pay the regular gravity scale price of $1.10 per barrel for Lisbon crude. Caddo Crude Oil Purchasing Co. (Grogan) which recently cut the price 12 cents to 98 cents and Gulf Refining Co., which followed the cut, are now taking the full 10,000-bbl. daily allowable from the field.

Barbour & Woods announce they have secured contracts for 53 connections, approximately one-third of the total. The contracts are for three years. They will construct their own gathering system in Lisbon.

The announcement of plans for this line has increased Lisbon activity, several rigs having arrived with others reported en route.

Mississippi River Fuel Co. to Construct Booster Station

Mississippi River Fuel Corp. is constructing a booster station at Nuckolls, 7 miles south of Newport, Ark., to boost the gas pressure before it crosses the White River at Newport. The contract has been let to J. F. Pickett Engineering Co., of Kansas City, Mo., with H. O. Ziebold, engineer for the Mississippi River Fuel Corp., as resident engineer.

Cities Service Gas Co. Completes Overhauling of Its Lines

Cities Service Gas Co. recently completed overhauling its gas lines and compressor stations in Oklahoma, Kansas and Texas in preparation for the winter peak in consumption. The addition of the 47-mile 12-inch line from the Fitts field to Seminole provided from 15,000,000 to 20,000,000 feet daily. The 8-mile 10-inch line from the Edmond field to Oklahoma City added a similar quantity.

The installation of a dehydrating plant at Pampa, Tex., to remove moisture from the gas before entering the Pampa-Wichita 20-inch line was designed to avoid the forming of ice which reduced capacity. Two field compressor stations of 230-hp. each, with gathering lines, were added to the Pampa field to boost gas from the low-pressure wells.

Oklahoma Natural Increases Pipe Line Work for 1938

The Oklahoma Natural Gas Co. announces a 28 per cent increase in allowance for Oklahoma City district pipe line expansion during 1938, amounting to $366,587. In addition, about $20,000 will be spent for six new regulator stations in Oklahoma City.

The 232,348 feet of pipe laid in Oklahoma City during 1937 was an increase of 55 per cent over 1936. A 15 per cent increase over 1936 was represented by the 1,700 new meters installed during the current year.

New Chattanooga Franchise Provides for Natural Gas

The city council of Chattanooga, Tenn., has been considering granting Chattanooga Gas Co. a new franchise for 40 years, bringing natural gas into Chattanooga.

"The $1,500,000 expenditure," said A. J. Goss, general manager of the company, "would include $500,000 for local extensions and improvements. The natural gas supply probably would be obtained from Southern Natural Gas Co., whose lines extend as far as Rome, Ga. The Rome pipe line, however, is too small, and Cedartown is the nearest point which has an adequate supply."

Southern Natural Gas Co., Birmingham, Ala., has filed with the Securities Exchange Commission a declaration covering the issuance of $650,000 first mortgage pipe line sinking fund bonds, 4½ per cent series due 1952. The bonds, are to be sold at 97¾ to a single purchaser. Proceeds will be used for plant and equipment.

Eastern Texas Line Project For Municipal Distribution

O. B. Siler and associates plan construction of a gas line from the wells near Joaquin, eastern Texas, through Nacogdoches, Lufkin and Center. The city council of Center has under consideration a municipal gas distribution system.

Iraq Pipe Line Punctured by Arabs in the Jordan Valley

The Iraq pipe line has again been punctured in the Jordan Valley and the escaping petroleum set on fire, according to reports in the Manchester Guardian. The disturbed state of the country growing out of the Arab disaffection over Palestine is supposed to have started a wave of banditry and vandalism by natives.

Michigan State Geologist Has Found No Collusion

SAGINAW, Mich.—Lack of understanding of the other fellow's problems, not discrimination or collusion between refiners and carriers against producers, is responsible for the recent protest raised by independent oil producers in Michigan fields, according to State Geologist R. A. Smith.

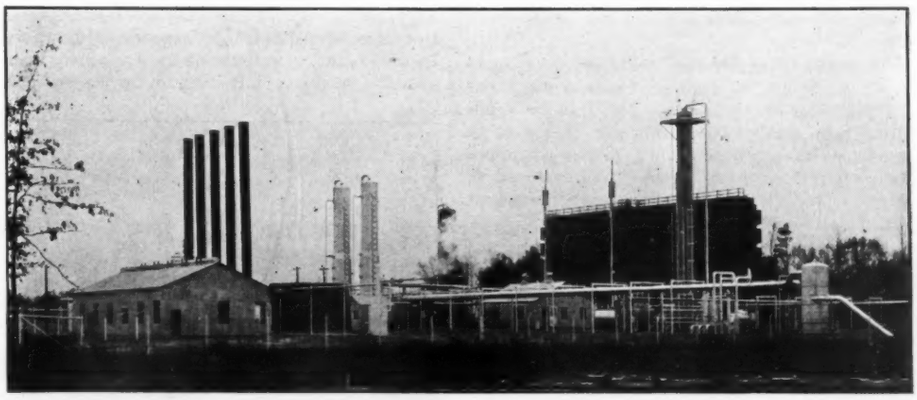
"I have interviewed representatives of every interested branch of the oil industry and found no evidence of collusion," he says. "But I have found a great lack of understanding of the problems each faces. The producer can't see the refiner's problems, and the refiner cannot see the producer's. And neither of them can see anybody else's problems.

Natural Gasoline

Barnsdall Awards Contract for West Texas Gasoline Plant

Barnsdall Oil Co. has awarded the contract for the construction of a new gasoline plant in the Foster field, 5 miles west of Odessa, Tex., to Petroleum Engineering, Inc., of Tulsa, Okla. Daily capacity of the plant is to be about 12,000,000 cubic feet, and will be the first to be completed in that field. The plant will be located about 3 miles from the Texas & Pacific Railroad in Ector County, Texas, and it cost of construction is estimated at $50,000.

NEW PHILLIPS CASS COUNTY, TEXAS, GASOLINE PLANT



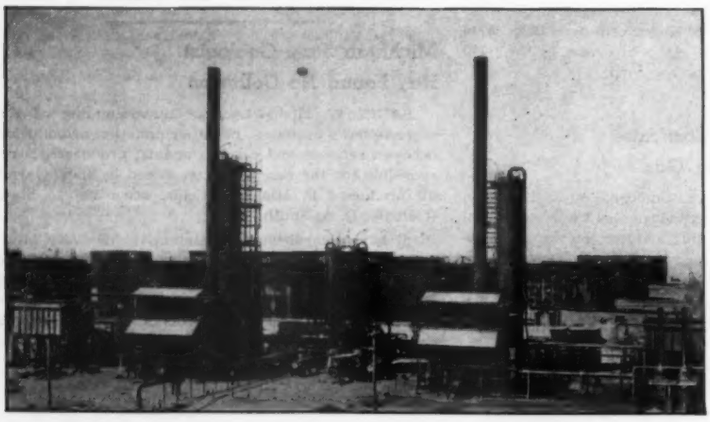
Phillips Petroleum Co.'s recently completed gasoline plant in Cass County, Texas. The new plant, located near Lodi, has a daily gas capacity of approximately 50,000,000 feet and will be operated at the well pressures to yield about 25,000 gallons of natural gasoline daily. Initial construction of the plant was started about one year ago, was delayed for some time, then was resumed latter in the year.

Wide Range of Refin

From Mixed Base Crude Produc

In the Persian Gulf, two weeks by fastest mail from the United States, lies the Island of Bahrein. On this remote bit of the old world, weeks by ship from the western civilized world, and on which there was but a few short years ago no evidence of modern industrial activity, a complete oil refinery now stands.

Native Bahrein crude is processed in this refinery at the present time. It is a mixed base petroleum of about 30-35° A.P.I. gravity. The volatility is similar to that of many crude oils in the United States; gasoline, kerosene, gas oil and heavy residuum fractions are present in quite normal proportions. A somewhat unusual distribution of hydrocarbon type characterizes the Bahrein crude, however; it is very paraffinic in the lower boiling ranges, but the heavy residues are typically asphaltic. Directly traceable to the paraffinic character of the volatile fractions is the exceptionally high quality of the kerosene distillate. Indeed Bahrein kerosene is a premium product, burning clear and smokeless at unusually great flame heights.



Crude stills at Bahrein Island refinery recently built by Bahrein Petroleum Co., Ltd. (Standard of California and the Texas Co.)

Nominally, the refinery crude charging capacity is 25,000 bbls. of crude per calendar day. Actually, removal of minor choke points in the crude distillation system will permit this figure to be exceeded materially. Finished products shipped from the refinery consist of several grades each of gasoline and kerosene, and of power kerosene, diesel fuel and bunkering fuel.

The principal refinery processing units, which are described below, consist of two crude stills, a reforming unit, two cracking and coking units, an acid and clay vapor treating plant for cracked gasoline, lead sulfide sweetening plants for gasoline and kerosene, an Edeleanu sulfur dioxide plant for treating kerosene and a special acid treating and rerun plant for power kerosene. The more important auxiliary plants, also described, are the power plant, acid and lime manufacturing plants, wet slop dehydrator, and leading plant for the addition of tetraethyl lead to gasoline. Full conventional tankage and unique loading facilities for delivering the finished products from the refinery complete the principal technical and operating features.

Conventional in most respects, the two crude stills include the somewhat unusual features of separate rerun columns for cutting between light straightrun gasoline and heavy gasoline for reformer charging stock. Superatmospheric pressure is required to condense the lightest cut; and to avoid imposing this pressure on the entire distillation unit, the rerun feature was adopted. Thus it is necessary to carry the higher pressure only on the rerun column, since condensation of the whole gasoline before separation of the light cut is easily accomplished at the low pressure of the main unit.

Fractions too light for inclusion in gasoline are plentiful in Bahrein crude, and make necessary the stabilization of the light straightrun gasoline. This stabilization is accomplished in a rather unusual manner by charging the unrectified light gasoline to the reformer stabilizer with the unstabilized reformed gasoline. Between the rerun column at the crude stills and the reformer stabilizer, the light gasoline is held in pressure storage. Handling the light gasoline in the manner described makes pressure storage for the rectified light cut unnecessary; moreover, instantaneous control of the volatility of the stabilized blend of light straightrun and reformed gasolines is possible, since it is necessary only to vary the proportion of reformed and light gasoline in the charge to the stabilizer to induce wide variations in the volatility of the stabilized blend. On the rare occasions when it is desired to rectify light gasoline while the reformer is not operating, steam replaces a side cut from the reformer fractionating column as a source of heat for the stabilizer reboiler.

Built primarily for once-through operation, the reformer can be operated recycling. The Equiflux furnace carries the load by either method with gratifying ease and flexibility. The unit was designed to charge 6,000 bbls. per stream day of gasoline, but is capable of handling loads materially in excess of this, ample allowance for overload having been made throughout.

Vapors from the reformer fractionating column pass directly to towers where they are clay treated before condensation and stabilization. Polymers from the clay tower, and bottoms from after fractionators, are returned to the main fractionating column and discharged from the system with reformer bottoms.

The two Dubbs process cracking units, nominally rated at 5,000 bbls. each per average day when running to coke, may be operated to produce liquid fuel, heavy pitch or coke. The charging stock consists of residuum and gas oil from the crude stills, plus bottoms from the reformer and from the clay vapor phase treater through which the cracked naphtha is processed.

Three Equiflux furnaces are included in each cracking unit, one each for light oil, heavy oil, and residuum delivered to the coking chambers. The flow arrangement follows conventional Dubbs process lines. Light oil, used as a sponge stock to recapture gasoline fractions which would otherwise be lost in waste gas from the unit, is withdrawn as a sidecut from the main fractionating column, cooled, and charged to the absorber. Heat for operating a wet stock dehydrating unit, is obtained from this stream by indirect heat exchange. The enriched oil from the bottom of the absorption column is returned to the main fractionating column.

Condensing turbines operating on 550-pound steam drive the plunger-type furnace charging pumps. Most of the other pumps are electric drive. In a few critical services turbine drives are provided as standby for the regular electric drives, and are arranged to pick up the load automatically if the electric power supply is interrupted.

Acid manufacturing and acid treating plants

ed Oils Made

ed on Bahrein Island

Corrosion resisting materials have been generously employed. Furnace tubes are of 18-8 chrome-nickel steel and calorized chrome molybdenum steel. Reaction and flash chambers are lined with 13 per cent chrome steel sheets. Lines and fittings which are subject to high temperature corrosion are made of 4-5 per cent chrome steel.

Three coke chambers are provided for each cracking unit, and are charged in rotation, a full chamber being emptied while the other two are on stream. Removal of coke from the coke chamber is accomplished by the use of vertical drills, which bore up through the coke bed from the bottom.

Stabilized naphtha from the cracking units is acid treated in a three-stage plant. Neutralization after acid is accomplished through the use of a lime slurry. After acid treatment, the naphtha is processed through a clay vapor phase treater. In this process, the naphtha is preheated in vapor heat exchangers, then charged to a fractionating column. Bottoms from the fractionating column are circulated by a hot oil pump through a furnace and back to a flash zone near the bottom of the column. Overhead vapors pass through two clay towers in parallel. Vapors from the clay towers are given a final fractionation in an after fractionator, condensed, and passed to storage. Polymers formed in the clay bed are delivered to the bottom of the after fractionator, where they join the bottoms from the after fractionator and are delivered to an intermediate point in the main fractionating column. Net bottoms and polymers from the unit are withdrawn as a portion of the stock circulating through the furnace.

At present, clay from the United States is used, both in this plant and in the clay towers at the reformer. Local clays have been found, however, which give promise of being entirely suitable for this service, and it is not improbable that the passage of another year will find the refinery no longer dependent upon foreign clay sources.

The acid treating, rerunning and clay treating combination, representing an unusually severe treatment, was adopted in order to provide greatest assurance that the gasoline would possess exceptionally good stability characteristics. It is typical of the extreme care which has been employed throughout in the selection of refinery processes. Nothing has been omitted which could contribute effectively to the uniformly high quality of the finished products.

The Stratco lead sulfide sweetening process is used for sweetening gasoline and kerosene. Separate treating lines and vessels are provided for each of the two products, although the parts of the plant devoted to storage and preparation of chemicals are not duplicated. The lead sulfide process was selected largely because of its simplicity and low chemical consumption which are features of particular importance in a refinery isolated as is that at Bahrein.

Manufacturing its own makeup SO_2, the 6,000-bbl.-per-day Edeleanu treating plant does not require chemicals which are difficult to handle. Sulfur, for the sulfur burner, caustic for neutralizing and salt for the dehydrator are the only chemicals required.

Incoming distillate is precooled by heat exchange, passed through salt filters to remove undissolved water and delivered to an absorber at atmospheric pressure. In this column, SO_2 vapors from a special sulfur burner are absorbed by the distillate. The distillate is then delivered to the lower portion of a vertical packed column into the top of which the main body of SO_2 is introduced. Counter-flow treatment is thus obtained, the raffinate rising to the top of the treating column, against the incoming SO_2. The extract settles to the bottom. Both raffinate and extract are freed of SO_2 by distillation, final traces of SO_2 being neutralized by caustic. Facilities for sharp fractionation are provided, making it possible to treat unusually volatile fractions without excessive loss of SO_2 in oil discharged from the system.

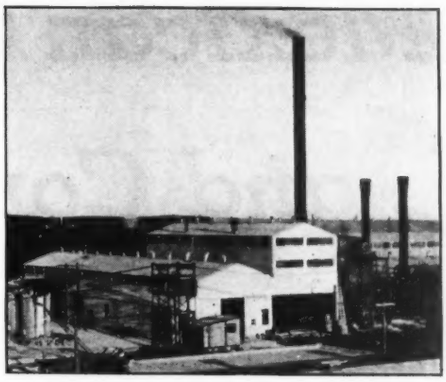
Water carried into the plant in solution is rejected continuously by distillation. Vaporized SO_2 from one of the extract evaporators is delivered to a fractionating column which is refluxed with dry SO_2. A steam heated, lead lined reboiler at the bottom of the column supplies the necessary heat for fractionation. Dry SO_2 vapors are taken overhead, condensed and returned to the treating system; water is discharged from the bottom of the column.

Finishing operations on power kerosene consist of acid treating, rerunning and sweetening. Acid is applied in a special continuous plant; the acid treated stock is rerun in a continuous rerun still, and sweetened in the gasoline sweetening plant. Both the acid treating and rerun units have excess capacity available for handling special products or miscellaneous stocks.

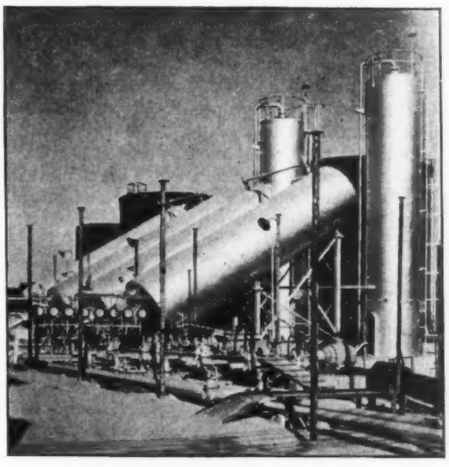
A discussion of the technical aspects of the refinery would be incomplete without a description of the principal auxiliary features. Outstanding among these is the power plant. Water containing 3,000 parts solids per million taxed the ingenuity of the design staff; it did not constitute an unsurmountable obstacle, but it did make necessary the adoption of unusual measures.

Steam at a pressure of 600 pounds per square inch is generated from distilled water exclusively. This steam is never employed for process purposes, nor in any service where it will not be returned as makeup water. It is used in condensing turbines to drive the hot oil pumps at the cracking units, and to drive the two 3,000-kw. turbo-generators which carry the refinery electric load. These turbo-generators are automatic extraction units, steam being extracted at 165 pounds, and at 55 pounds. Steam not extracted goes through to the condensers.

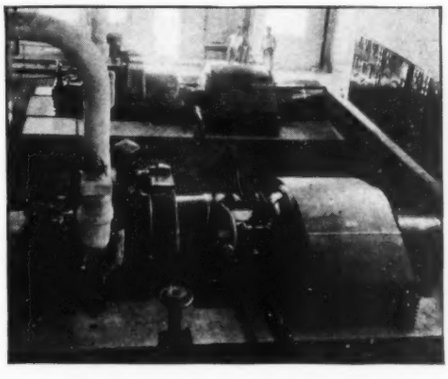
Other auxiliary plants which are of interest are the acid and lime manufacturing units. The acid manufacturing plant, designed by the Chemical Construction Corp., is rated at 20 tons of 93 per cent acid per day; sulfur is burned to supply the necessary SO_2 for conversion to acid. Native deposits of lime provide the raw material for the lime plant. A conventional lime kiln is used for burning, and a hydrator converts the quick lime from the kiln into the hydrated form used for neutralization. The plant furnishes lime for construction purposes as well as for neutralization.



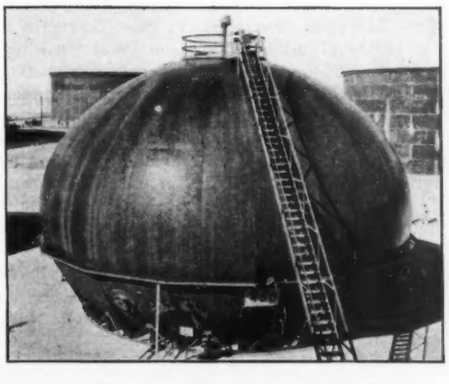
Exterior view of power house



Part of lead sulfide treating plant



Turbine driven electric generating units



Water-sprayed pressure tank

Mexican Crude Oil Production and Consumption Increase

Despite labor difficulties and other uncertainties, oil operations in Mexico, both from the standpoint of consumption and supply, continued to expand in 1937. Crude oil production increased to approximately 46,000,000 bbls., a gain of approximately 5,000,000 bbls. over 1936.

Consumption of petroleum production will total 20,000,000 bbls. by the end of the year, continuing a gain which has resulted in demand approximately doubling over the past eight years.

Up to December 1, 40 wells had been completed. Of this number 25 were productive with an initial capacity of 8,813 bbls. daily. Authorized drilling permits for the first 11 months totaled 172, which is greater than the total for the two previous years.

The following table shows the productive wells that have been completed in Mexico the first 11 months of 1937:

Fields—	No. of wells	Initial capacity (bbls. dly.
Laredo (Tamps.)	1	Gas
Mier (Tamps.)	2	Gas
Camargo (Tamps.)	2	Gas
Altamira (Tamps.)	2	164
Cacalilao (Panuco)	1	13
Panuco (Diversos)	5	590
Quiebrahacha (Topila)	1	145
Rancho Abajo (Tantima)	1	201
Acalapa (Istmo)	2	1,667
Choapas (Istmo)	1	315
El Plan (Istmo)	5	5,649
Santa Rosa (Istmo)	1	50
Jaipa (Tabasco)	1	19
Total	25	8,813

The five gas wells have a total capacity of 1,232,000 cubic meters daily.

Months—	Productive— No. of wells	Init. dly. production (bbls.)	Dry holes
January	4	3,227	1
February	2	566	2
March	..	....	..
April	..	....	..
May	1	38	3
June	2	352	1
July	2	315	1
August	3	107	1
September	2	1,151	4
October	4	2,541	1
November	5	516	1

Production of crude oil during the first 11 months reached 6,765,845 cubic meters, or 42,557,-164 bbls. The Mexican production of crude oil during the last five years has been as follows: 1933, 34,000,000 bbls.; 1934, 38,171,946 bbls.; 1935, 40,240,563 bbls.; 1936, 41,027,915 bbls.; 1937 (estimated), 46,000,000 bbls.

Poza Rica Field

Special mention should be made of the famous Poza Rica field, situated in the Papantla region in the northern part of the state of Veracruz, which with the surrounding property will be exploited as a unit by Cia. Mexicana de Petroleo "El Aguila" S.A. and by the General National Administration of Oil. This is in accordance with the agreement made with Cia. El Aguila (Royal Dutch-Shell interests) and the Government of the Federation.

In accordance with the agreement, the minimum work program for this largest producing field in Mexico will be as follows:

(a) Cia. El Aguila will drill about 100 wells, in which the nation will have a participation.

(b) The government will drill 44 wells, with ownership of their total production.

(c) Cia. El Aguila is obligated to maintain in the zone covered by the agreement, five drilling rigs, as a minimum, operating continuously.

(d) The government will maintain as a minimum a similar number of drilling rigs to equal those that the company will have in operation.

Several estimates have been made regarding the possible reserves of this field. Experts agree that this field may be as important as the famous Faja de Oro (Golden Lane). Ezequiel Ordonez, engineer and geologist, as expert for the oil interests, said in his report of July, 1937, that the possible reserves of the Poza Rica field may be estimated as 500,000,000 bbls.

The possible oil area in Mexico is estimated at 7,567,015 hectares (18,698,094 acres). Only 100,-000 hectares (247,100 acres) have been exploited up to now.

Camp of "El Guila" in the Poza Rica field, Papantla, Mexico

Production of refined oils will during the present year total about 40,256,000 bbls., compared with 38,830,736 bbls. produced in 1936.

The following tabulation shows the production of refined oils during the last five years: 1933, 29,384,823 bbls.; 1934, 37,331,137 bbls.; 1935, 35,875,-084 bbls.; 1936, 38,830,736 bbls.; 1937 (estimated), 40,256,000 bbls.

Exports will reach during the 12 months a possible total of 23,000,000 bbls. of crude and refined oil. Oil exported from Mexico during the last five years follows: 1933, 22,026,121 bbls.; 1934, 25,018,-181 bbls.; 1935, 22,445,972 bbls.; 1936, 25,050,754 bbls.; 1937 (estimated), 23,000,000 bbls.

Consumption

Oil products consumed by Mexico during the last five years are as follows: 1933, 13,416,073 bbls.; 1934, 16,265,795 bbls.; 1935, 17,966,863 bbls.; 1936, 18,252,863 bbls.; 1937 (estimated), 20,000,000 bbls.

In consumption, gasoline occupies a prominent place, as it use has been increasing rapidly since 1925, and during the present year it will probably reach a total of 500,000,000 liters, compared with 424,618,278 liters consumed in 1936. This is the result of the wise road policy which the Mexican government has been following.

The gasoline consumption in Mexico has been as follows: 1933, 260,035,302 liters; 1934, 313,120,-740 liters; 1935, 354,550,999 liters; 1936, 424,618,278 liters; 1937 (estimated), 500,000,000 liters.

Average daily production of natural gas and crude oil in Mexico by fields:

Natural gas—	Cubic feet
Sabinas (Norte de Coahuila)	1,765,500
Gral. Bravo (Norte de Nuevo Leon)	5,824,386
Mier (Norte de Tamaulipas)	4,945,943
Camargo (Norte de Tamaulipas)	40,006,230
Rancherias (Norte de Tamaulipas)	8,198,530

Crude oil fields—	Bbls.
Rancherias (Norte de Tamaulipas)	6
Altamira (Cuenca de los rios Panuco y Tamesi)	855
La Pimienta	12
Mata del Muerto	31
Champayan	50
Tulillo	1,112
Limon	629
Salinas	186
Chapacao	4,296
Cacalilao	8,944
Corcovado	855
Garrucho	81
Salvasuchi	578
Potrero del Ojital	232
Lopez	143
Tampacas	175
San Jose	67
Las Delicias	106
Las Piedras	446
La Polla	44
Alamo a Miradores	194
San Manuel	408
F. Gutierrez	25
E. Gonzalez	150
Panuco	75
Ingenio	201
Tanantoro	540
Tierritas-Blancas	18
Tanchicuin	119
Camalote	94
Halcon	18
Laguna de la Milpa	364
Chijoles	138
Potrerillos	44
Mahuaves Occidental	50
El Palmar	6
Mahuaves Oriental y Vegade Otates	440
Buenavista	289
Potrero de la Campana	106
Zuniga	6
Tampuche	125
Los Mangos	6
Potrero de la Isleta	282
Lomas y Llanos	56
Punta Arena	6
El Barco	194
La Palma	37
Paciencia	271
Tamante	130
Palangana	133
Paciencia y Aguacate	258
Loma del Pozo	13
Quiebrahacha	239
Santa Fe	44
Tamboyoche	50
Topila	69
Caracol	100
San Sebastian (Norte de Tuxpan)	69
San Jeronimo (Faja de Oro)	150
Dos Bocas	100
Tepetate	309
Chiconcillo	130
Chinampa	2,208
Amatlan	5,341
Toteco	3,013
Zacamixtle	264
Cerro Azul	3,873
Moralillo	79
Alazan	515
Cerro Viejo	743
Potrero del Llano	493
Horcones	409
Tierra Blanca	4,301
Chapapote	250
Palo Blanco	....
Alamo	465
Jardin	160
Paso Real	804
Tanguijo (Centro de Tuxpan)	3
Tierra Amarilla (Centro de Tuxpan)	73
Comales (Tantoyuca, Ver.)	6
Poza Rica (Region de Papantla y rio Cazones)	66,994
Furbero	3
Gavilan Norte (Noreste del Istmo de Tehuantepec)	3,736
Gavilan Sur	2,358
Teapa	....
El Plan	19,103
Filisola	1,352
Tecuanapa	....
Acalapa	6
San Miguel (Faja de Oro)	33

Note—Information for this summary of Mexican operations furnished by Petroleum Department of the Mexican government.

Germany Is Drilling 140 Wells, Approximately Half Being Wildcat Tests

By CARL H. EHLERS

Nienhagen field of Germany

At present a total of about 140 strings of tools are in operation in the various sections of Germany of which about half are wildcats. The greatest activity is in the Nienhagen field with some 40 new wells drilling. The regions most promising for the discovery of additional new oil fields are located in the north German plain with its numerous salt domes.

Germany's crude oil output in 1937 aggregated approximately 3,430,000 bbls., the largest in her oil producing history. Production for the four previous years was as follows: 1933, 1,788,772 bbls.; 1934, 2,361,390 bbls.; 1935, 3,150,000 bbls.; 1936, 3,334,815 bbls.

The production comes from nine fields widely separated in location: Nienhagen, 17 miles north of the city of Hanover; Wietze, 16 miles northwest of Hanover; Oberg, 17 miles southeast of Hanover; Oelheim-Berkhoepen, 20 miles east of Hanover; Moelme, 25 miles southeast of Hanover; Gifhorn, 35 miles northeast of Hanover; Heide, 50 miles northwest of Hamburg; Forst, 15 miles north of Karlsruhe, Baden; Volkenroda in Thuringia.

The principal producing field is the Nienhagen field with an estimated production for 1937, amounting to 2,600,000 bbls. or 76 per cent of Germany's total output. During the current year, the Nienhagen field has been extended principally in the southeastern direction. This field seems to have a much greater potentiality than has been foreseen. It is said that Nienhagen could produce at least 500,000 bbls. per year more than this year's output and it is stated that the substantial reserves in this field are being kept in the ground for emergency purposes, probably also owing to a scarcity in materials for storage facilities.

Nienhagen Extension

Between the village of Nienhagen and the village of Wathlingen, the Wintershall Potash Concern, one of the principal producers in the Nienhagen field, through a semiwildcat well succeeded in extending the field three-quarters of a mile to the southeast. On the west side of the south end of the Nienhagen salt plug, the Gewerkschaft Elwerath encountered production and on the east side of this dome, the Gewerkschaft Siegfried was successful in its drilling operations. Drilling is also in progress near the village of Haenigsen at the extreme south end of the Nienhagen field. The principal producer in the Nienhagen field is the Gewerkschaft Elwerath, with a yearly output of approximately 1,700,000 bbls.

The production near Wietze comes from Germany's only "oil mine," where the oil sand is mined through gallery operations. The 1937 output is approximately the same as in the preceding years, totaling 337,000 bbls.

The Oberg field produced during the current year about the same quantity as last year. More than 90 per cent of its output belongs to the Deutsche Vacuum Oel A.G., wholly owned subsidiary of the Socony-Vacuum Oil Co., Inc. The gas-lift method was used in this field with the result that many of the old bore holes have been brought back to their initial production. A number of semi-wildcats are being drilled on the edge of the Oberg salt dome with a view to discovering new horizons.

In the old Oelheim-Berkhoepen field, drilling operations are suspended for the time being. The "Preussag" (Prussian Mining Co.), Deutsche Petroleum A.G. and Gewerkschaft Elwerath are, however, engaged in drilling operations close to the village of Oelheim with indications of encountering new production in this section; the prospects of new discoveries around the Oelheim-Berkhoepen salt dome therefore seem to be brighter.

Production on the Moelme dome comes from shallow depths, 150 to 450 feet, on the east side of the dome. A well drilled to a depth of 1,200 feet on the west side of the dome also encountered production. The entire output of the Moelme field amounts to approximately 7,500 bbls. per month.

The Gifhorn field is only small in extension. The production comes from shallow depths of about 900 feet. Drilling operations are conducted now also on the west side of the River Aller, with a view to discovering production from deeper horizons.

In the Heide district (north of Hamburg) a small production was discovered several miles north of the original field discovered in 1936. Producing has been rendered difficult, in as much as the fissures of the chalk formation are also yielding water. Seven miles north of the city of Heide, near the village of Henstedt, drilling operations have disclosed promising oil showings. North of the Harz Mountains, near the Fallstein, the Preussag has one well, which produces regularly several hundred barrels per day; the second and third wells in this territory were unsuccessful; the fourth well is drilling now while the fifth is reported to be started soon.

Near the town of Forst in Baden, operations seem to be quite encouraging, in as much as also south and north of the original field, satisfactory production has been encountered, coming from a depth of only 600 feet. A small production is obtained at present near the village of Sottorf, a few miles south of the city of Hamburg, from shallow depth of approximately 900 feet. It is reported that deep tests will be started in the near future on the flanks of this dome. The operating companies at Sottorf are the Preussag and Deutsche Vacuum.

In the Volkenroda (Thuringia) district, a number of deep tests have been drilled, during the past two years without success. Two of the wells had good gas showings. Activities in this region have been suspended for the time being. However, a small production is obtained in the shafts of a potash mine. In Bavaria at the Tegernsee Lake, a small production of very light oil is derived from a well from a depth of approximately 600 feet. A deep test is in the process of drilling in this southern-most section of Germany. In the west, near Bentheim at the Holland frontier, a deep test well is drilling at a depth of approximately 4,500 feet. So far nothing has been reported with respect to the outcome of this interesting test.

New Field

In 1937, drilling operations yielded only one new field, which, however, has all the earmarks of being of major importance. In September of the current year, a wildcat, drilled by the Preussag in conjunction with the Deutsche Vacuum Oel A.G., near the village of Reitbrock, a few miles southeast of Hamburg, came in with an initial production of 1,500 bbls. from a depth of 2,100 feet. The second well yielded a similar output, while a third and fourth are in the process of drilling. It is reported that owing to lack of storage tanks, the holes are plugged for the present.

It is worth noting that not far from this new discovery, near Neuengamme, a gas well produced over 6,000,000,000 feet of gas. The well was drilled in 1911; the gas was purchased by the city of Hamburg and turned into the city gas mains. Strangely enough, no other wells have been drilled in this region.

Between the structures of Reitbrock and Sottorf, geophysical investigation disclosed the presence of another salt dome near the village of Meckelfeld where drilling operations have yielded promising oil showings, so that operations are continued there.

Southwest of Wietze, near the village of Rodewald, a German subsidiary of the Royal Dutch-Shell on a newly discovered salt dome, has encountered production in a well of shallow depth (900 feet) yielding several hundred barrels daily. Additional drillings to deeper horizons are progressing in this section.

South of Gifhorn near Hillerse at the Rolfsbuettel dome, drilling operations have found strong gas showings. Intensive development is in progress in this section. Farther to the southeast of the village of Broistedt, a wildcat came in from a depth of about 2,700 feet with a flush production of several hundred barrels per day.

In the upper Rhine Valley, near the city of Worms, a deep test is reported to be productive. Details are not as yet available. Exploration opera-

(Continued on Page 78)

Preslit

New oil field in Bibi-Eibat, Azerbaidjan, U.S.S.R.

Oil Fields of the U. S. S. R.

A Descriptive Outline of Their Geography, Geology and Relative Productiveness

By WILLIAM J. KEMNITZER

The total area of the U.S.S.R. is 8,172,146 square miles, of which at the present time 775,000 square miles, or 9.5 per cent, is considered land in which commercial accumulations of petroleum may be found. These figures compare with a total area of 3,026,789 square miles for the United States, of which 1,056,000 square miles,[1] or 34.9 per cent, is considered land in which petroleum may be found. The total petroleum reserves (proved, prospective, and possible) in the U.S.S.R. are estimated at 44,632,700,000 bbls,[2] while those in the United States are estimated at 20,398,289,000 bbls.[1] Proved (including prospective) reserves of the U.S.S.R. amount to approximately 6,178,200,000 bbls[2] compared with 13,360,000,000 bbls.[3] for the United States. Up to January 1, 1937, the U.S.S.R. had produced 3,684,758,000 bbls. of crude petroleum while the United States had produced 18,693,588,000 bbls.

While proved reserves of the U.S.S.R. amount to 13.8 per cent of the total reserves, those of the United States amount to 65.5 per cent of the total. In the United States, however, 47.7 per cent of the estimated ultimate production has been produced while in the U.S.S.R., only 7.6 per cent of the ultimate has been produced. At the present time there are less than 45 developed oil fields in the U.S.S.R. compared with about 2,250 in the United States.

In the United States most of the obvious geologic structures (those reflected at the surface) have been tested, but in the U.S.S.R. only a small percentage of such structures has been prospected. More than 630 such structures are being surveyed at the present time, and approximately 72 of them are being tested by deep drilling. It is plain that, whereas development of petroleum lands has reached a full stage in the United States, in the U.S.S.R. development is in its infancy, despite the fact that the U.S.S.R. is probably the the oldest oil-producing country in the world.

The U.S.S.R. may be divided into five petroliferous regions, namely, the Caucasus, Emba-Volga, Ural, Central Asia, and Far East. The Caucasus region is in the central southern part of European U.S.S.R. between the Black and the Caspian seas. The Emba-Volga region is in the southeastern part of European U.S.S.R. north of the Caspian Sea. The Ural region fronts the Ural Mountains along the western side of European U.S.S.R. The Central Asia region is in the southwestern part of the Asiatic section of U.S.S.R. north of Persia, and Afghanistan. The Far East region is in eastern Siberia.

The Caucasus is the most important region at present. It produces about 92 per cent of the current output of crude oil and up to January 1, 1937, had produced more than 97 per cent of all the crude oil thus far produced in the U.S.S.R. It holds nearly 87 per cent of the proved reserves, 44 per cent of the possible reserves, and accounts for 54 per cent of the estimated ultimate production of the nation. Following in order of largest ultimate production are the Emba-Volga, Ural, Central Asia, and Far East regions.

(Description and map of the Caucasus region will appear in later article.)

Emba-Volga Region

The Emba-Volga region embraces that country drained by the lower reaches of the Volga, Ural, and Emba rivers which, in southwest European

TABLE 1—COMPARISON OF PETROLIFEROUS LAND AREAS, PRODUCTION, AND RESERVES OF CRUDE PETROLEUM IN THE U.S.S.R. WITH THOSE OF THE UNITED STATES, JANUARY 1, 1937

(Areas in square miles; production and reserves in thousands of barrels of 42 U. S. gallons)

Item—	U.S.S.R. Total	U.S.S.R. Per cent	U.S.A. Total	U.S.A. Per cent
Classification of land (sq. mi.):				
Favorable	775,000	9 5	1,056,000	34 9
Unfavorable and impossible	7,397,146	90 5	1,970,789	65 1
Total area	8,172,146	100 0	3,026,789	100 0
Production and reserves (thous. bbls.):				
Production to January 1, 1937	3,684,758	7 6	18,693,588	47 7
Proved reserves	6,178,200	12 8	13,360,000	34 4
Possible reserves	38,454,500	79 6	7,038,289	17 9
Ultimate production	48,317,458	100.0	39,091,877	100.0

[1] Based on figures given by Ralph Arnold and W. J. Kemnitzer in "Petroleum in the United States and Possessions," p. 21 and p. 51, 1931.

[2] Based on figures of I. M. Gubkin given before the Seventeenth International Geological Congress, Moscow, July 23, 1937.

[3] Estimate of H. B. Soyster, U. S. Geological Survey, in "Petroleum Investigation," Part 2, p. 1081, U. S. Government Printing Office, Washington, 1934.

U. S. S. R., flow across a broad alluvial plain into the northern end of the Caspian Sea. Physiographically, the region represents the basin of an ancient Caspian Sea which at one time covered most of the area. The limits of this ancient basin describe an arc around the northern end of the sea, extending inland an average of about 350 miles from the present shore. The entire Emba-Volga region has an area of approximately 220,000 square miles or a little less than that of the state of Texas.

Marine deposits of Quaternary age cover most of the region, but recent fresh-water deposits appear over large areas, especially west of the Volga River. East of the Ural River are large patches of eolian deposits. In the eastern part of the region mainly in the Emba district, Upper Cretaceous strata appear at the surface and in many localities, Lower Cretaceous rocks crop out. West of this Cretaceous area, and in places throughout it, are Tertiary beds which in turn are overlapped by the Quaternary from the west. At isolated places throughout the plain along the Ural River and westward therefrom, comparatively small patches of Cretaceous, Triassic, and Permian rocks come to the surface. Salt domes are a characteristic of the region, and more than 1,000 of them are known. Oil is produced chiefly from the Lower Cretaceous (?), Middle Jurassic, and Upper Permian.

The region may be divided into two districts: the Emba, east of the Ural River mainly in the valley of the Emba River; and the Lower Volga and Kalmyk-Salsk Steppes, west of the Ural River past the Volga and around to the foothills of the Main Caucasus. At present, the only productive localities are in the Emba district. Production of crude oil in the entire region during 1936 averaged about 9,014 barrels daily, or 1.6 per cent of the total for the U. S. S. R. Commercial production began in 1911, and up to January 1, 1937 a total of 38,430,000 bbls. had been produced, or about 1.0 per cent of that produced to date in the U. S. S. R. Proved reserves are estimated at 223,000,000 bbls., or 3.6 per cent of the national total, and possible reserves at 9,381,400,000 bbls., or 24.4 per cent of the total. The region is second only to the Caucasus in reserves, but its possibilities have not been well explored mainly because transportation facilities are meagre, the country is desolate and comparatively inaccessible, and markets are remote. At the beginning of the year, only four new localities were being prospected by deep drilling.

TABLE 2—AREAS OF PETROLIFEROUS LAND, NUMBER OF OIL FIELDS, YEAR OF FIRST PRODUCTION, DAILY AVERAGE OUTPUT, NEW LOCALITIES BEING PROSPECTED, PRODUCTION AND RESERVES OF CRUDE PETROLEUM IN THE U.S.S.R., BY REGIONS, JANUARY 1, 1937

	Area		Producing oil fields		Year of first production	Daily average output of crude		New localities prospected	
	Square miles	Per cent	No.	Per cent		bbls.	Per cent	No.	Per cent
Caucasus	81,000	10 4	15	51 7	1821	514,010	91 8	43	57 7
Emba-Volga	220,000	28 4	7	16 7	1911	9,016	1 6	4	5 6
Ural	273,000	35 2	3	7 1	1929	18,739	3 3	15	20 8
Central Asia	52,000	6 7	7	16 7	1863	12,271	2 2	9	12 5
Far East	9,000	1 2	1	2 4	1921	5,908	1 1	1	1 4
Other	140,000	18 1	0	.....	....	0	.....	0	.....
Total U.S.S.R.	775,000	100 0	42	100 0	1821	559,944	100 0	72	100 0

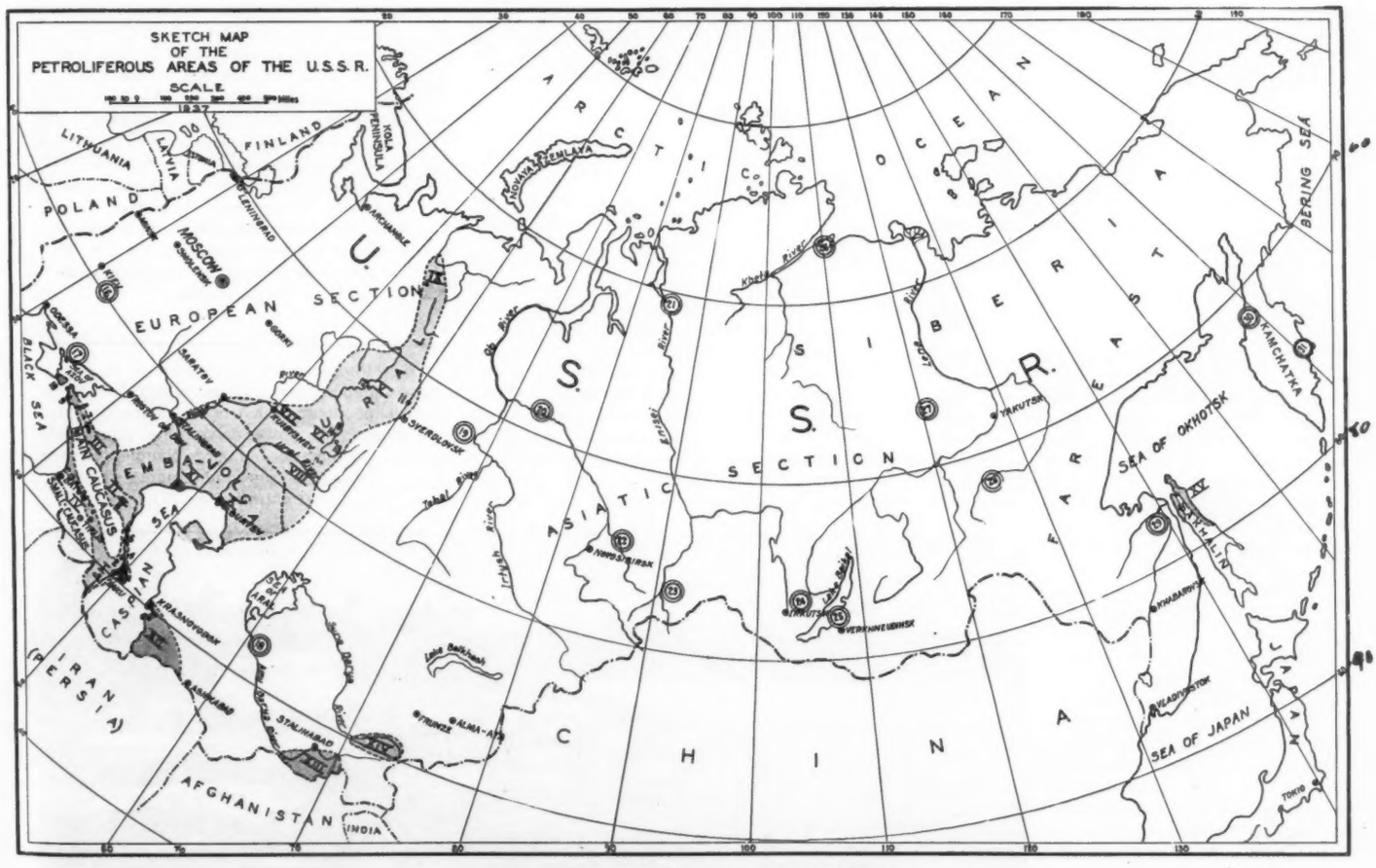
	Past production		Reserves — Proved		Reserves — Possible		Ultimate production	
	Thous. bbls.	Per cent	Thous. bbls.	Per cent	Thous. bbls.	Per cent	Thous. bbls.	Per cent
Caucasus	3,591,504	97 5	5,352,900	86 7	17,090,500	44 5	26,034,904	53 9
Emba-Volga	38,437	1 0	223,000	3 6	9,381,400	24 4	9,643,137	20 0
Ural	13,573	.4	317,100	5 1	6,899,200	17 9	7,229,873	15 0
Central Asia	29,589	.8	142,100	2 3	2,847,600	7 4	3,019,289	6 2
Far East	11,655	.3	142,800	2 3	2,235,800	5 8	2,390,255	4 9
Other	0	.....	0	.....	0	.....	0	.....
Total U.S.S.R.	3,684,758	100 0	6,178,200	100 0	38,454,500	100 0	48,317,458	100 0
Per cent	7 6	.....	12 8	.....	79 6	.....	100 0	.....

Emba District

The Emba district is commonly referred to as the Emba Basin. It is a low, structural depression lying between the southern extension of the Ural Mountains on the east and a great fault zone along the Ural River on the west. The country is flat and featureless except for occasional mounds of earth. The land rises gradually from the seacoast to the foothills of the Mugodjar Mountains.

The rocks at the surface are largely loosely consolidated sediments of Quaternary age but Creta-

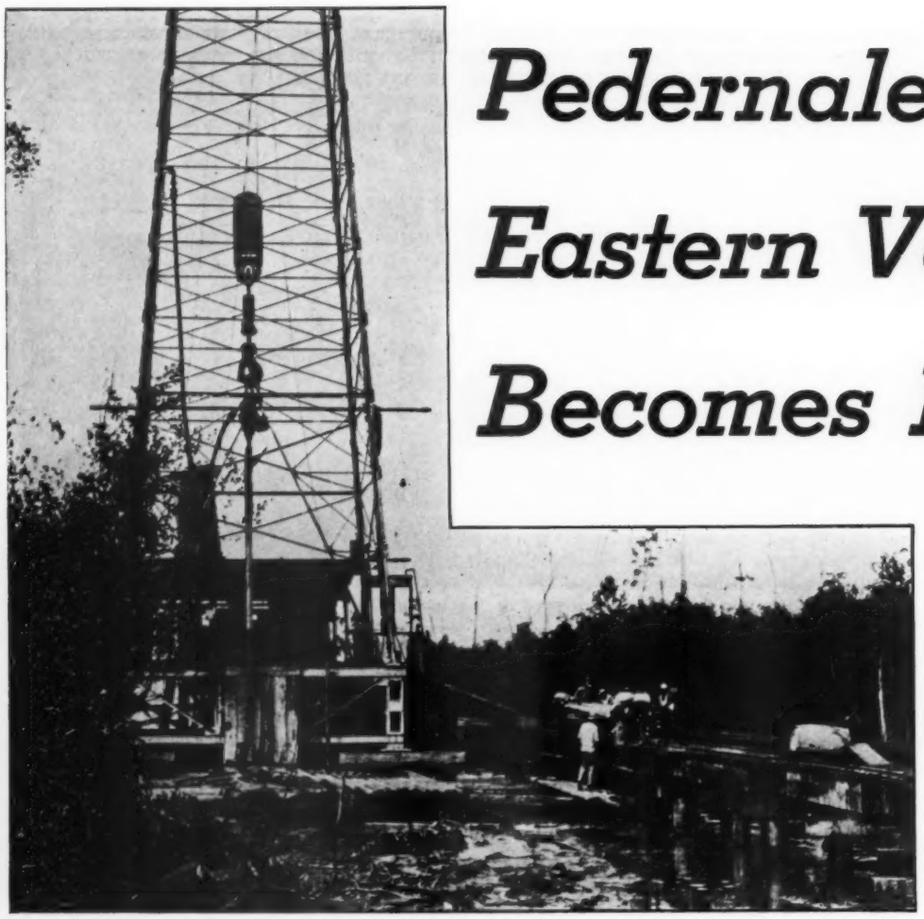
(Continued on Page 303)



Productive oil fields shown as shaded areas

Caucasus region: I. Azerbaidjan—1, Apsheron Peninsula; 2, Kabristan; 3, Kura Plain; 4, Caspian. II. Northeast Caucasus—5, Grozny; 6,Daghestan III. Kuban and Azov-Black Sea—7, Maikop; 8, Kuban; 9, Taman Peninsula; 10, Crimea. IV. Georgia. Ural region: V. Permian Prikamye; 11, Verkhne-Chussovoskye-Gorodki; 12, Krasnokamsk. VI. Bashkira—13, Ishimbaevo; 14, Smakaevo; 15, Ryazanovka. VII. Samarskaya Luka. VIII. Orenburg-Aktyubinski. IX. Ukhtinski. Emba-Volga region: X. Emba. XI. Lower Volga and Kalmyk-Salsk Steppes. Central Asia region: XII. Turkmen. XIII. S. Uzbek and S. Tadjik. XIV. Ferghana Valley. Far East region: XV. Sakhalin. Other areas: 16, Romenski; 17, Melitopol; 18, Western Uzbek; 19, River Tavdy; 20, River Yugan; 21, Estuary of Enisei; 22, Kuznetsk Basin; 23, Minusinsk; 24, Western Pribaikal; 25, Lake Baikal; 26, Khatagan; 27, Lena-Vilyui; 28, River Aldan; 29, Amur; 30, Voyampol; 31, Bogachevsk.

Pedernales Field in Eastern Venezuela Becomes Important



Derrick built on timber mat in swamp land

The Pedernales field, which is being operated by the Standard Oil Co. of Venezuela, is located in Venezuela near the south shore of the Gulf of Paria on Cano Manamo, the most northern mouth of the Orinoco River.

The oil produced is approximately 20 degrees A.P.I. gravity, black in color, and has an asphalt base. It contains a high percentage of sulfur and has a produced gas-oil ratio of about 600 cubic feet per barrel. The gas is sweet and carries no trace of sulfur. Viscosity is about normal for an asphalt base crude of 20 degrees A.P.I. gravity.

Initial subsurface or reservoir pressure is remarkably high, averaging about 50 per cent above the hydrostatic head to the surface. As a result extremely heavy mud must be carried when drilling into the producing section if blowouts are to be avoided. The development of this field is greatly complicated by existing surface conditions, chief of which is the absence of dry land in the vicinity. Four of the present wells are on pile foundations in Cano Manamo itself, which at that point is about 35 feet deep. The remaining wells are on Isle Cotorra, a low swampy piece of delta land which is completely submerged during high tides. As a result, all construction offshore, including flow stations and well foundations, must be on piling, and marine equipment must be used for transportation. On shore, timber mats or piling must be used to provide foundations, and a narrow-gauge railroad on a pile-supported trestle must be constructed from the landing pier to each well location or station site. The resultant operating cost is naturally high compared to operations on solid ground.

A camp site would be out of the question on Isle Cotorra, but across the cano, about 2 miles away, is a low sandy ridge which rises a few meters above the mangroves of the surrounding swamp, and on this ridge is being constructed a modern camp with all conveniences and a tank farm for crude storage. Between the ridge and the water's edge is a narrow-gauge railway which connects material wharf and tanker berth with the camp site, and on a dredge made fill along this railroad is being constructed the warehouses, shops and material yards required for the field. Shallow draft ocean freighters unload material here direct from United States or European ports.

Drilling problems are numerous and varied. After driving 20-inch welded steel piles and capping them with a steel substructure and 122-foot derrick, special drilling equipment must also be provided for marine operation. Two types of rigs are in use. The first is a diesel-electric unit mounted on two barges. Power is generated by three 260-hp. diesel engines directly connected to D.C. generators and exciters. These supply current to a 150-300-hp. motor which operates the drawworks and rotary. The power-driven mud pumps which are mounted on a second barge complete with mud pit, reserve mud storage, and cementing equipment

(Continued on 78)

Editor's Note

The Pedernales field in eastern Venezuela is the youngest producing area in the country from a standpoint of commercial operations. First crude oil from Pedernales was issued to the market in October, 1936. During the first 10 months of 1937, the Pedernales field produced 1,052,735 bbls. of crude. Starting with daily average output of 1,756 bbls. in January the yield reached a high in September for the 10 months when daily average production was 5,053 bbls. Wells are completed near the 5,000-foot level, but final depth varies from location to location due to the steep dipping strata and to position with reference to surface. There have been other discoveries subsequent to finding of the Pedernales field, but it is the latest to figure in supplying production to the world market.

Temporary material storage at Pedernales, eastern Venezuela

Unusual Problems Present in Seismograph Work Abroad

By JOSEPH L. ADLER
Independent Exploration Co.

Although seismograph surveys to determine geological structure were first successfully applied by Dr. Ludger Mintrop of Germany, Doctor Mintrop introduced them very early into the United States and since that time seismograph exploration in the United States has led that in all other countries. It may be said in general that none of the seismic methods had been applied outside of the United States until after being brought near perfection by work done in this country. This statement is more nearly exact with respect to reflection seismograph surveys than with respect to the refraction type. Until five years ago there had been practically no reflection surveys conducted outside of this country. At that time reflection work was introduced into Europe and South America. With the exception of surveys in Venezuela, however, no considerable amount of such work was done abroad until very recently.

Complete seismic equipment

During this period there has been a gradual increase in the use of the reflection seismograph in foreign countries and for the last six months the increase has been very noticeable.

The problems involved in conducting seismograph surveys outside of the United States are more of a practical nature than scientific. Geological conditions which determine the scientific aspect of these problems are so varied in the United States that scientific problems of a different sort are not likely to arise in foreign countries. An exception to this statement is to be found in certain oil fields of Europe and Asia where very complex structures occur. These fields are located on overthrust faults, fan folds, overturned folds or nappes. However, the success of the reflection seismograph in delineating such structures is questionable. Successful interpretations have been made on those complex structures where a great deal of knowledge as to their form was already in the hands of the geophysicist interpreting the seismic reflections, but in areas of unknown structure, where the deeper structure is concealed by surface beds, such interpretation becomes so difficult that it is not possible to venture an unqualified opinion as to the interpretation.

The reason that so many European and Asiatic oil fields are located on structures of this type is that either fracturing or erosion of the beds in the foothills of the mountain chains have permitted oil to seep to the surface. It is only natural that the first drilling for oil should have been undertaken in such areas, where outcrops permitted interpretation of the structure from surface geology and where oil seepages existed. Bordering most of these areas, however, are flatter lands where younger deposits lying nearly horizontal conceal the structure of the oil-bearing beds. It is a reasonable assumption that in these latter regions, lying farther from the mountains as they do, the structure of the oil-bearing beds will be less complex. Those regions are better adapted to the use of the reflection method and are therefore the logical places in which to apply the reflection seismograph for working out the structure of deeper beds. An example of such a region investigated only recently is the salt dome area of the Hanover Basin in Germany.

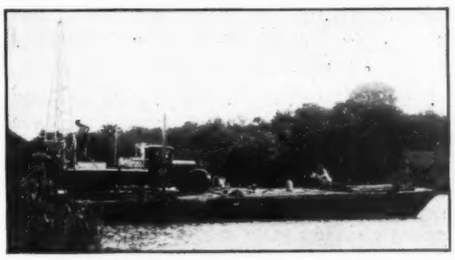
Modern geological and geophysical research in that area has developed an oil field of unexpected potentialities. Seismic exploration in the broad valleys and lowlands bordering on many foreign oil fields should yield equally successful results in many similar areas.

The practical problems of seismograph surveys in foreign countries are likely to be very different from those of the United States. This is due to the great variety of geographical and cultural conditions. Some such surveys are carried on in civilized countries, amply supplied with roads, machine shops, proper food and living quarters for the staff and with intelligent labor available in quantities. In such countries the practical problems are little different from those in the United States.

Many foreign countries have few or no roads. Some contain large deserts where the supplying of food, water and labor are all difficult. In others work must be done in heavily forested mountains or swamps, many with an unhealthful climate. In some areas, unfriendly and even savage natives, complicate the problem still further. As a rule, surface geological work has been done in most of these regions before seismograph work is attempted, but geological work can be carried on with a small party of from one to four or five men and therefore does not require the preparation for housing and supplying with food which is required by a seismograph party involving seven or eight technical men and from eight to 40 laborers, depending upon conditions. Furthermore, the geologist can carry most of his instruments in his pocket, while the transportation of seismograph equipment is not so simple.

Drilling the shot hole by hand

For this reason it has been the tendency of most of the manufacturers of reflection seismographs to reduce the size and weight of their equipment to a minimum. In fact, with enough labor available there is no part of the shooting and recording equipment that cannot be carried to the required places by hand. But in order to obtain satisfactory results, shot holes must be drilled by some method, and it is the transportation of the drilling equipment where there are no roads which presents the greatest problem.



Drilling shot holes from barge

In areas where the soil is soft enough to be cut by post hole augers to a depth of 30 or 40 feet, holes drilled by hand with these implements will in some cases yield satisfactory results. Using post hole augers as bits, these holes can be carried deeper under similar conditions by using small motors, which can also be transported by hand, to rotate these augers. Under other conditions hand portable mud pumps and rotating motors can be used together with 1-inch pipe and 3- or 4-inch fishtail bits to carry holes as deep as 70 or 80 feet. All of the above drilling equipment can be carried by porters and where holes of that depth will suffice, if the rocks near the surface are not too hard to be drilled with this equipment, a seismograph survey can be conducted without automotive equipment of any kind.

In some areas, however, it is necessary to use drilling equipment delivering greater weight and pressure on the bit. For this purpose, extra-small portable drills have been devised which can be carried on a light truck, and can be quickly taken apart and carried by pack animals. Except where very firmly indurated beds must be penetrated, the rotary type of drill serves the purpose best. These drills should be equipped with a separate motor and not operated by the motor of the truck in order that the drill may be knocked down and carried piece by piece to inaccessible shot points and there be reassembled for drilling. Such rigs should be equipped with a pulldown capable of delivering 1,200 or 1,500 pounds of pressure in order to obtain full efficiency. Where very firmly indurated rocks lie near the surface the safest procedure is to supply three or four small demountable cable

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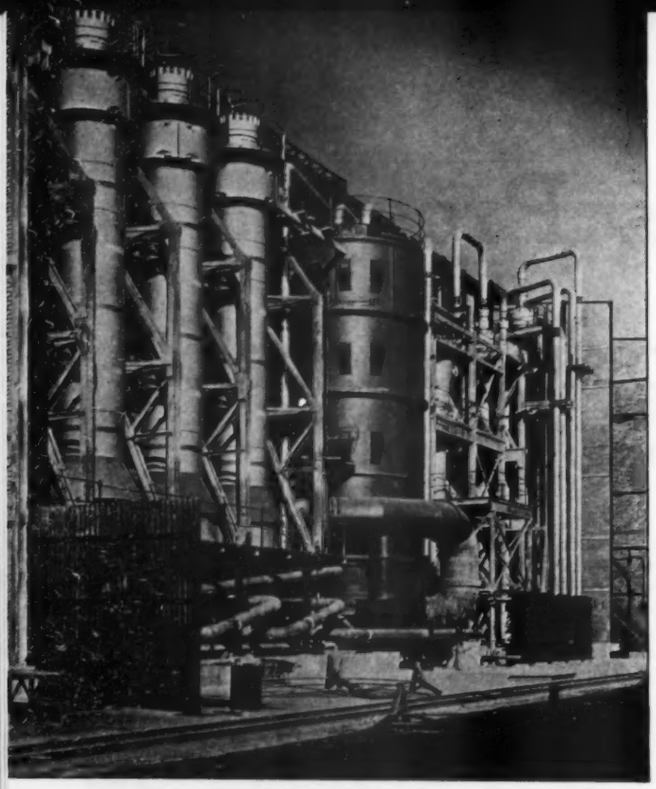
Nationalistic Are Proving



Motor fuel from coal is the objective of this hydrogenation plant at Billingham, England

The pursuit by an increasing number of European and other countries of national self-sufficiency in regard to fuel supplies is a matter which vitally concerns the oil industry. So far as Europe is concerned, the reasons for the development of this type of policy, which runs so strongly counter to the general trend of economic progress, are both economic and political.

European states have, in the past, supported relatively high standards of living, largely by means of the exchange of their products and manufacturers for those of other countries. Since the war trade relations have been seriously impeded both by the general impoverishment and by the multiplication of fiscal boundaries, resulting from the rearrangement of territories under the treaties of peace. While the effects of these changes could perhaps have been mitigated, given an atmosphere of mutual trust and good will, psychological conditions in the years following the war were not favorable to the removal of trade barriers. With the onset of the depression at the end of the last decade international trade virtually disappeared, unemployment rose to dangerous heights and the stability of currencies was undermined.

The result was to provide an enormous stimulus to the development of self-contained economic policies, which seemed, and in some cases still seem, to offer the only alternative to a complete collapse of the national currency. The effect that such policies must have in preventing the trade recovery which is essential to any real advance in standards of living has again and again been pointed out by economists, but these appeals have to a great extent fallen on deaf ears.

Political Reasons

The reasons for this are at least partly political. Self-sufficiency, until recently regarded as a regrettable necessity which was forced upon a country by inability to secure foreign currency to pay for its imports, has now become, for some countries, a condition to be sought after on account of its military advantage.

During the war, the importance of key industries, such as optical glass and chemicals, to a belligerent country was demonstrated. In addition to key industries, there are, it is now realized, key materials. In order to become secure against the possibility of the interruption in war time of supplies of such essential materials as oil, steel, copper, nickel, and rubber, no sacrifices are accounted too great. Modern industrial chemistry, it is claimed, places it in the power of those nations which are lacking in many important materials to produce substitutes by synthetic means and thus to redress the "sanctions" unfairly imposed on them, as they feel, by nature. It would, however, be a mistake to underrate the influence of agitations sponsored by sections of producers, such as the coal interests in Great Britain, agricultural circles in many continental countries and the owners of large forests who hope to draw advantage from the substitution of a home-produced for an imported article of consumption.

In the domain of liquid fuels, the means taken to replace imports by home production are many and various.

Subsidize Drilling

First of all, there is, of course, the encouragement by governments of drilling for crude oil. In Germany, for example, direct subsidies have been paid to stimulate drilling, but probably because the results obtainable did not seem sufficiently encouraging these subsidies have not reached very large dimensions. Actually, no important fields have been discovered in the new districts, while the yield from the older fields has remained more or less stationary for some years. German crude production at present represents rather less than 10 per cent of her total oil requirements. Other European countries, excluding Poland and Roumania and, of course, Russia, are still less favorably situated. The oil production of Albania, which is under Italian control, can at present only be indicated by a question mark. The oil is very heavy in character and apparently unsuitable for normal refinery treatment.

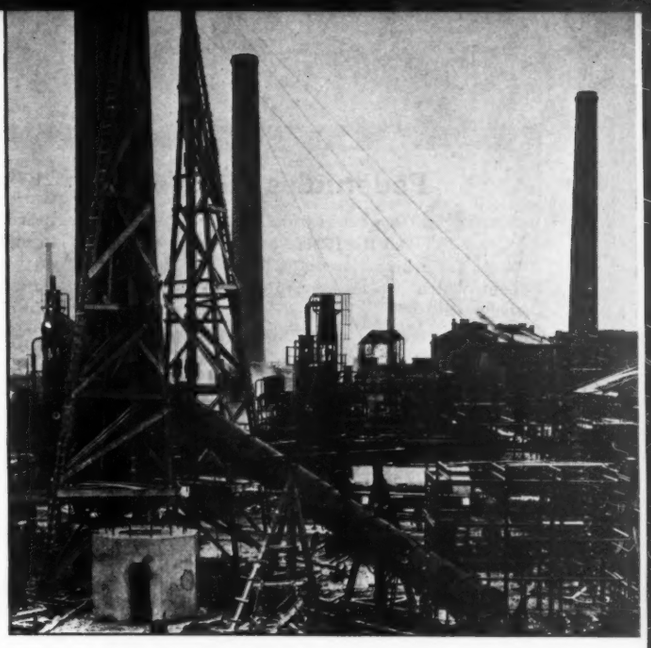
The search for crude oil deposits, which, if discovered, would possess great economic value, is, of course, on a different footing from the policies described below.

The compulsory admixture of from 10 per cent to about 20 per cent of alcohol made from farm products with motor gasoline is an expedient which has been introduced in many European countries, primarily in order to assist agricultural interests. The crops generally used for this purpose are potatoes, sugar beets and maize. The countries which use the highest percentages of alcohol are agricultural countries, like Hungary and Latvia, where motoring is not very extensively developed. However, now both Italy and Japan have, for purposes of strategic self-sufficiency, decided to raise the overall percentage of alcohol in motor fuel to 20 per cent as rapidly as supplies can be made available. It is likely to be some time before this result can be fully achieved in either case on account of the difficulty of raising the additional crops which are needed to provide raw material for the extra quantity of alcohol. In Germany the policy of converting farm products into alcohol for use as motor fuel has been found to conflict with the pursuit of national self-sufficiency in foodstuffs. Consequently, although the deficiency of supplies of agricultural ethyl alcohol has been partly made good by methanol produced synthetically from water gas, the overall percentage of alcohol mixed with motor fuel has had to be reduced from 10 per cent to 8½ per cent.

In 1936, 662,000 tons of alcohol were used for mixing with gasoline in 11 European countries. It is estimated that the compulsory purchase of this quantity entailed an addition to the distributing costs of the oil companies of approximately $141,000,000, or over 8½ times the cost of an equivalent quantity of gasoline excluding import duties. The governments of these countries gave direct subsidies to producers of agricultural alcohol amounting to a total of $69,250,000, and, in addition, were deprived of $48,000,000 in respect of import duties and other taxes which they would have collected on the gasoline replaced by this alcohol. Alcohol is, of course, only attractive, from a self-sufficiency point of view, to countries which have a surplus production of farm products. To Great Britain, for example, where industrial alcohol is largely made from imported molasses, alcohol is of no value strategically, because approximately 2½ tanker loads of imported molasses would be needed to produce the equivalent of one tanker load of gasoline.

Tank farm and refinery at Talara, Peru

Policies on Oil to Be Costly



Construction at refinery located at Lwow, Poland.

The most outstanding development of self-sufficiency policies in regard to oil supplies is to be found in the synthetic production of oil from indigenous coal and other carbonaceous materials. In this Germany leads the way. In the 10 years that have elapsed since the opening of the original high-pressure hydrogenation plant of the I. G. Farbenindustrie at Leuna in central Germany considerable progress has been made in the building up of an industry capable of replacing gasoline imports by home production. In 1937, for the first time, however, the output of the German synthetic oil industry increased sufficiently to overtake the growth of gasoline consumption and to enable imports to be substantially reduced. Gasoline imports for the year will, nevertheless, amount to about a million tons, or approximately 40 per cent of the country's total gasoline requirements, and it is not to be expected that gasoline imports will diminish down to vanishing point for some time, if they ever do.

There is, however, no reason to doubt that it is technically possible for Germany to continue to multiply her oil-from-coal plants until she is in a position to produce the whole of her normal gasoline requirements from her own coal and lignite. It is an open question whether this would make her genuinely self-sufficient in time of war. That such a development can only be achieved by means of economically unsound employment of a part of the man-power resources of the country goes without saying. Every ton of synthetic gasoline which is produced requires the hewing, transportation and treatment of from 4 to 16 tons of coal or lignite. Expressed in terms of money, it would cost Germany approximately 600,000,000 Reichsmarks to produce all the gasoline which she needs and which she can import for 200,000,000. Even so, there remains the problem of heavy oils, particularly gas oil, of which Germany uses very large quantities, and lubricants. Here the obstacles to the total replacement of imports by home production are likely to prove even greater.

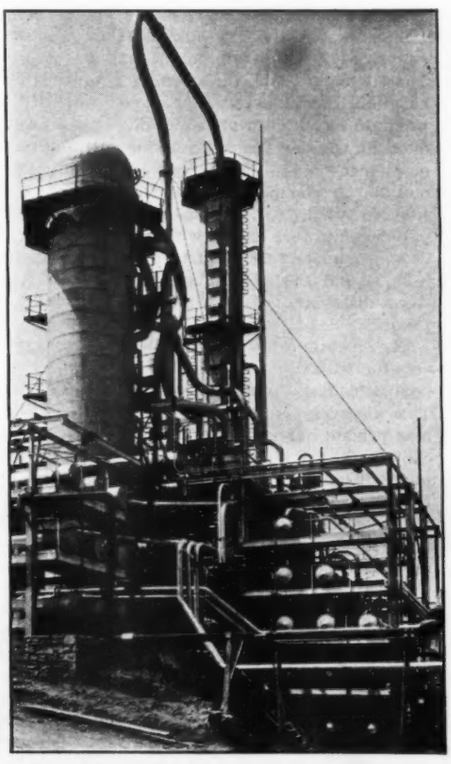
Thus, by dint of enormous financial sacrifices Germany sees herself in sight of possible independence of foreign imports in regard to one important oil product only.

Japan and Italy

The example of Germany has, however, had sufficient influence to induce other countries to attempt to follow in her footsteps. The most outstanding examples are Japan and Italy. In Italy, the problem is attended by a further complication in the lack, so far as can be seen at present, of indigenous raw materials to form the basis of a synthetic fuel industry. There is, indeed, some irony in the spectacle of a country building enormously expensive plants for the purpose of making synthetic products from materials which may themselves have to be imported when the finished products could be purchased just as easily at one-third of the cost.

In Japan, plans of a far-reaching character have been worked out by the Japanese government in conjunction with the principal industrial groups, but their realization is likely to be postponed in view of the financial requirements and extra demand for materials due to the war in China.

Although the British government, by granting substantial relief from taxation to gasoline produced from indigenous materials, secured the erection of a large coal hydrogenation plant at Billingham in 1934. The results, from an economic point of view, have admittedly not been favorable. Statements made by Lord McGowan, chairman of Imperial Chemical Industries, in the House of Lords indicate that further government assistance would be necessary to persuade private capital to extend the scale of the experiment. Although in all probability the tendency to the production of a certain proportion of gasoline requirements from coal in the United Kingdom will be continued, it is unlikely that the government will be prepared for the enormous financial sacrifices which would be necessary to develop synthetic oil production on a scale large enough to make a material change in the country's methods of obtaining its oil supply. Strategically, Great Britain is very much more favorably situated to secure oil supplies in the event of war than most other nations, owing to her control of the seas, the possession of a large tanker fleet and the soundness of her financial position, coupled with extensive and widespread interests in oil. These circumstances enable her to draw supplies from a large number of different sources, so that if oil were prevented from reaching her by one route, it could be brought in by another.



Vacuum fractionator and exchangers in the Aguila refinery at Trieste, Italy.

High Costs

It is also recognized, to a certain extent, that the high cost and cumbersomeness of production from coal are disadvantages, even from the point of view of national security. For example, to supply a quantity of gasoline equal to Britain's normal peace-time consumption would require 30 plants, each of 150,000 tons output, the total cost of which would approximate to $1,000,000,000.

The annual sacrifice of revenue if no gasoline were imported would amount to $225,000,000, while serious unemployment would be caused in shipbuilding yards owing to the cessation of orders for tankers. In war time it is doubtful whether the plants could be defended successfully against attacks from the air, while some 180,000 men, or roughly 1½ times as many men as compose the British regular army, would require to be immobilized for the purpose of operating these plants and of supplying them with coal.

Coal and Wood Gas

Still another form of self-sufficiency policy in regard to motor fuel is to be found in the encouragement given in a number of countries to the use of gas made from coal or wood to propel road vehicles. Two methods are employed; one is the use of low grade "producer gas," which is generated in the vehicle itself as it travels; the other is the use of portable cylinders containing compressed gas. Both methods involve a reduction in the power output of the engine and in the payload of the truck or omnibus on account of the extra weight which has to be carried. In some cases bonuses are paid for the conversion of vehicles to run on gas, in addition to the remission of registration and fuel taxes. In spite of the fiscal advantages, the proportion of users who find it to their advantage to change over from liquid fuel to gas remains practically negligible.

It would be excessively optimistic to hope for the early reversal of self-sufficiency policies in regard to liquid fuels on the part of those countries which have adopted them largely for reasons of a noneconomic character, although it is inevitable that, as time goes on, the serious additions to the cost of fuel in countries which adopt these methods will be felt more and more heavily. It is only as the result of an improvement in political relations that the abandonment of such policies can be looked for.

Pedernales Field

(Continued from Page 74)

are each driven by 150-300-hp. motors. The mud barge has a heavy second deck above this equipment which serves as a pipe rack for drilling operations.

The second type of marine drilling unit is steam operated and is essentially the same as that developed in the Lake Maracaibo operations. In this unit, the mud pumps, mud circulating system and pipe rack are arranged much as in the electric barge, but power is supplied by a battery of 125-hp., 300-pound W.P. boilers mounted on the far end of the barge.

Water supply for drilling and other purposes is a serious problem, since Cano Manamo is a tidal river which at Pedernales carries salt water during the winter months, and is brackish much of the year. After exhausting local possibilities, it was necessary to build a 40-kilometer water line through swamp lands, and a water pump station to provide sufficient water for the operation on three rigs and auxiliary services.

After drilling has begun, new difficulties arise. The steep dip of the strata makes it necessary to use high rotating speeds and light weight on the bit to avoid wide deviations from the vertical.

After Pedernales wells are brought into production, the oil is flowed through 4-inch submarine pipe lines to central gathering stations, which are

Location of Pedernales field in eastern Venezuela

equipped with gas separators, tank batteries and power pumps of the horizontal duplex type. Close production control is exercised on all wells and the wells produced on chokes which prevent excessive declines in reservoir pressure and resultant increase in gas oil ratio. Initial subsurface pressures are much higher than normal, but after a rapid decline to approximately the equivalent of the hydrosatic head, there is a perceptible falling off in subsurface pressure decline. Initial production also declines rapidly until pressures level off, when they too show retarded decline.

From the gathering stations, the oil is pumped through a submarine pipe line to the tank farm across the river. The laying of this submarine line was quite a feat in itself. The pipe was welded into lengths of 90 feet and coated with a protective enamel on shore. It was then rolled on a 90-foot barge which was equipped with welding facilities and a rollway over the stern. The pipe line was then welded together, length by length, on the barge and paid out into the water. The barge was maneuvered by means of its anchors and great difficulty was experienced in holding it broadside to the racing tidal currents that flow in and out of the river each day. Aside from one of two unexpected bends when anchors or anchor lines failed to hold, the 7,000 feet of line was laid without serious trouble and in excellent time considering the swift currents.

Taking all things into consideration, the Pedernales field is an expensive place to operate. Repeated disappointments in early test wells followed by high drilling and producing costs have resulted in a substantial investment prior to the establishment of assured commercial production.

Germany Drilling 140 Wells

(Continued from Page 71)

tions have also been started in Germany's eastern provinces at the Polish frontier, where near the town of Jastrow drilling has commenced.

An interesting deep test is being drilled in the south of the State of Oldenburg through joint operation of the subsidiaries of the Socony-Vacuum Oil Co., the Standard Oil Co. of New Jersey and the Royal Dutch-Shell group, which companies have combined their interests in this concession (comprising approximately 1,300,000 acres) for exploration. The well now drilling near the village of Dinklage at a depth of about 3,000 feet, had a number of promising showings. In all probability additional wells will be drilled in this region.

In southern Germany near the town of Ehingen in Wuerttemberg, a test well has been started after discovery of asphalt. In the southwestern section of Bavaria, near Passau at the Austrian frontier, drilling operations have commenced by the Bayerische Mineral-Oel A.G., subsidiary of the Socony-Vacuum Oil Co. No details are available so far as to the outcome of operations in this district.

Until 1933, Germany's rather modest production, if compared with her steadily increasing demand, for all oil products was derived from the four fields: Nienhagen, Wietze, Oberg and Oelheim-Berkhoepen. Up to 1933, the exploration program of the few financially strong private drilling companies, projected to discover new fields, resulted only in disappointments, one after another. Thereupon, in 1934, the German government decided on the inauguration of a systematic drilling program to obtain a more definite answer to the question whether there are, besides the four above mentioned fields, other regions capable of yielding outputs in commercial quantities. From April, 1934, to April, 1937, 162 wells, subsidized by the government, were drilled with an aggregate depth of approximately 500,000 feet with the result that in 1935 and 1936, the following four new fields were discovered: Heide, Moelme, Gifhorn and Forst.

As mentioned, the most outstanding success for 1937 is represented by the discovery of a new field near Reitbrock, southeast of Hamburg. This discovery is apt to encourage also the German private companies to expand operations especially in the salt dome regions of the North German plain extending from Hamburg towards the Holland frontier.

It will be noted that the prospects to increase Germany's producing capacity are not unfavorable. The new discoveries of the last two years indicate that crude oil deposits seem to exist in many sections of the Reich, widely separated from each other and under different geological conditions. There are at least 100 known salt domes of which only a small number have been investigated systematically so far. In view of the fact that the German government under the four-year plan has commenced geophysical investigation of the underground on a large scale and that governmental subsidies for operations in promising regions are readily granted, the belief is advanced that Germany in due course will enter the ranks of the more important crude oil producers, at least, in Europe.

Hungary's Largest Oil Well May Prove Important Field

By far the largest oil well ever developed in Hungary and a producer which may be even more important to Europe in general resulted last week from test of European Gas & Electric Co. No. 2 Budafaputza, near Lispe. On December 9, the new Hungarian discovery flowed 352 bbls. of high gravity oil through one-fourth inch choke in 24 hours. The following day it flowed 363 bbls. through three-sixteenths inch choke and when shut-in on the third day after producing nearly 10 hours, it was flowing at the rate of 336 bbls. per day through three-sixteenths inch choke. Pressure in the well is reasonably high and gives indication of originating in a rather extensive reservoir.

The new producer is in the southern part of Hungary and is bottomed at 3,962 feet. No other production of such a substantial nature exists in Hungary which is almost completely dependent on imported crude and petroleum products. The nation is not a large consumer, the requirements being about 5,000 bbls. per day.

The structure near Lispe was previously proven for gas production from the zone in which oil was obtained in No. 1 Budafaputza. Indication the structure was capable of oil production was given when the original gas well started producing about 10 bbls. of high gravity oil, or distillate, when reopened after it had been closed in for several months. Drilling of the second test resulted in the oil discovery. European Gas & Electric Co. is an affiliate of Standard Oil Co. (New Jersey).

Plans have not been completed for a drilling program, but there seems little doubt exploration will continue at least on a moderate scale. The export market open to Hungary is rather extensive in central Europe. The only large producing nation is Rumania where the trade barrier of currency restriction has made consistent traffic with neighboring nations practically impossible. Hungary is in position to benefit materially from the oil strike since its outlay of strong currency for foreign petroleum supplies might be directed into other channels if its own production can be increased to supply internal demand.

Production in Colombia And Peru Gains in 1937

Although Colombian production declined slightly in November from October, the output for 11 months of 18,472,890 bbls. is substantially above the 17,114,474 bbls. for the same period in 1936.

Tropical Oil Co., subsidiary of International Petroleum Co., in turn subsidiary of Imperial Oil Co., produced 1,797,625 bbls. during November, a daily average of 59,921 bbls. In October the total recovery of 1,811,759 bbls. was slightly greater, but the daily average was only 58,444 bbls.

International Petroleum Co. production in Peru is dropping slightly below the 1936 level in the later months after building up a margin of excess during the first six. International output in November was 1,181,673 bbls., compared to 1,235,120 bbls. in October and with 1,267,028 bbls. in November, 1936. From a daily average output of 39,843 bbls. in October, International production in Peru dropped to 39,389 bbls. per day in November. During November, 1936, the production was at the rate of 42,234 bbls. per day.

Despite the fact that International production has dropped below the 1936 level, increased output by Lobitos Oilfields, Ltd., to about 8,000 bbls. per day has held the total for Peru at a higher total.

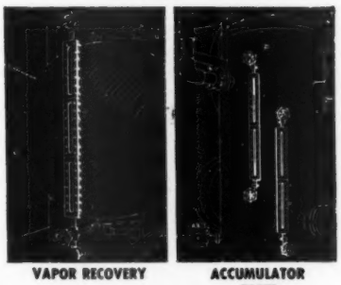
Colon Development Production Increased by Completion

Production from the Tarra field in western Venezuela is due for another increase in December as a result of Colon Development Co. Ltd.'s latest completion. Colon No. T-82 gauged flowing production of 970 bbls. per day the middle of this month at 2,936 feet. Colon has been engaged since the middle of 1937 in additional development in the Tarra field (Las Cruces) resulting in substantial production increases from month to month during the last quarter.

PENBERTHY
Reflex Gages
(Licensed under Jerguson Patent)

have many refinery and natural gasoline plant applications

MULTIPLE TYPE EQUIPPED WITH DROP FORGED STEEL GAGE VALVES



VAPOR RECOVERY — ACCUMULATOR TANK

● The sketches show only a few of the many important applications for Penberthy Reflex Gages in oil refineries and natural gasoline plants. As a matter of fact, Penberthy Reflex Gages are preferred wherever a liquid level must be easily and positively visible . . . when that liquid is under pressure or at high temperature (or both).

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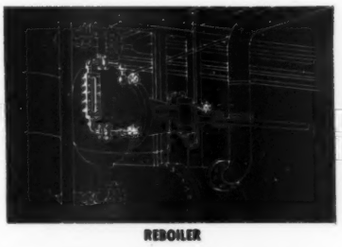
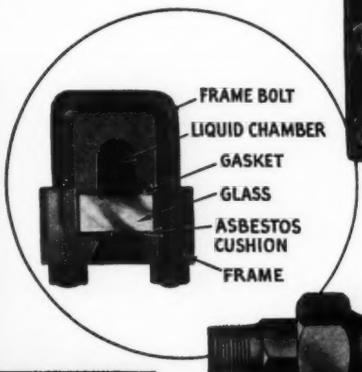


REBOILER



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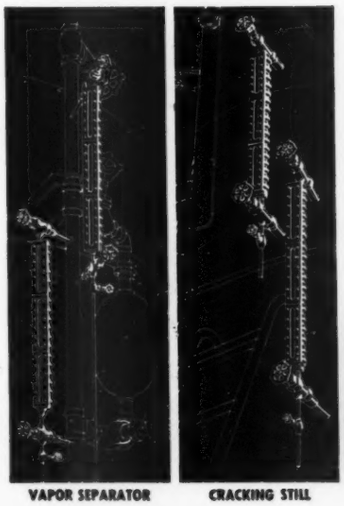

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Foreign Markets for American Made Petroleum Equipment

By PAUL L. HOPPER and W. H. MYER
Metals and Minerals Division — Machinery Division
Department of Commerce

American equipment for petroleum well drilling and petroleum refining has for many years been in the forefront of technical development, and has been in demand in all parts of the world where oil is found. The greater part of our general industrial machinery exports naturally goes to the nations which are in a high state of industrial development, because of the need for productive equipment of the most efficient kinds, such as the United States is able to provide. But some of the greatest oil resources outside of the United States are found in countries having few factories or large scale industries, so our foreign trade in equipment for oil production and refining does not always follow the main channels through which flow the currents of our other machinery exports. In recent years, Venezuela, for example, has been our largest single foreign market for petroleum equipment, and large amounts are taken by the Netherlands East Indies, Trinidad, and Afghanistan.

During 1937 our exports of oil well and refining machinery have had a strong upturn. Up to the end of September we shipped abroad more than $26,000,000 worth, greatly surpassing our trade of a little less than $19,000,000 in the whole of last year, and substantially exceeding the figure for 1929 of about $24,500,000. If the final tabulations show that the last three months kept pace with those of the earlier period, our total exports should be well over $34,000,000. The accompanying table gives the total exports, with the amounts shipped to the 12 countries constituting our principal foreign market.

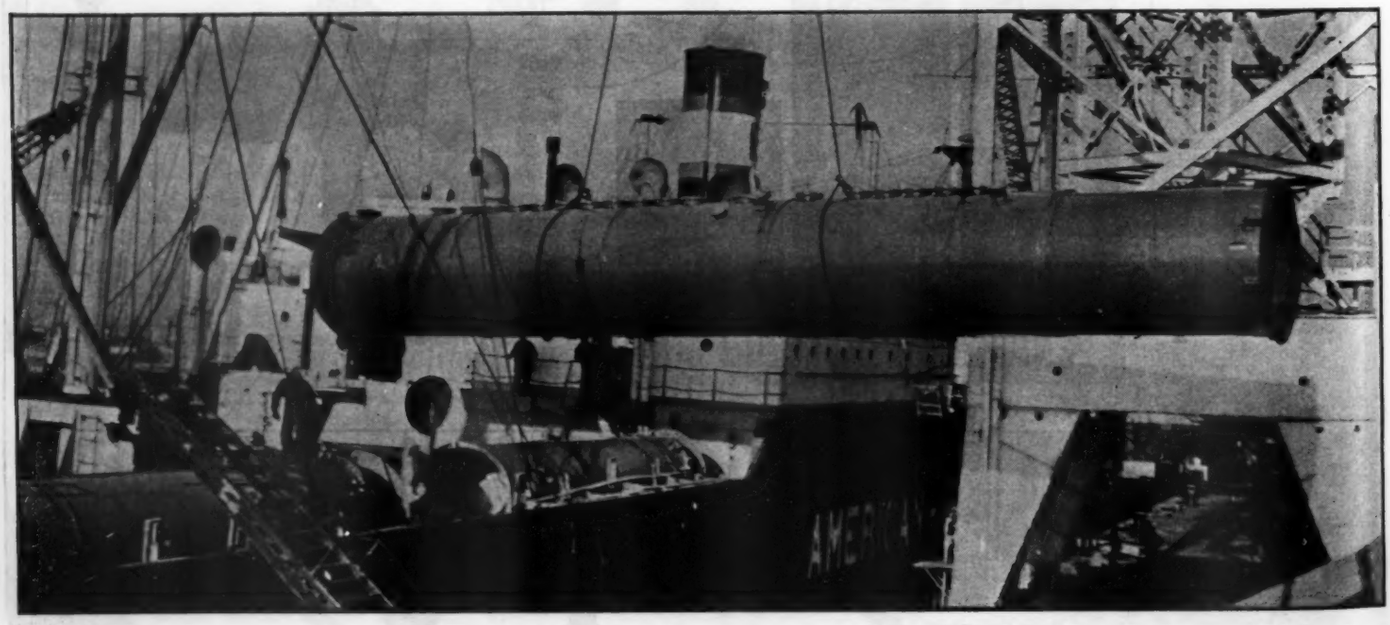
The first 10 countries enumerated in the table accounted for about 83 per cent of our foreign shipments of oil well drilling machinery in 1936 and more than 86 per cent so far this year, and for more than half the exports of other petroleum equipment in each period. Russia and Italy are heavy buyers of refining apparatus, but take little drilling equipment.

It is not unexpected that Venezuela, ranking third in world production of petroleum and having much American capital invested in the industry, would provide an excellent outlet for oil well drilling machinery exported from the United States. Some slowing of operations in 1936 due to strikes may have slightly curtailed purchases of oil-producing machinery in that year, but granting of new concessions and lack of internal disorders during the current year to date have sufficed to boost production to 20,054,000 metric tons during January-September, a gain of 2,244,000 metric tons over the same period of last year. This rise in oil production, occurring principally in the Cabimas, Lagunillas, and Quiriquire fields has been accomplished with extension of drilling facilities, most of which came from the United States.

Production of petroleum in Netherlands India is almost entirely in the hands of two large international companies, one British, the other American. Production of oil, rising steadily for several years, in the first nine months of the current year exceeded the comparable period in 1936 by nearly 25 per cent. This increase in crude output has been the result of expansion of operations, mostly through greater use of

UNITED STATES EXPORTS OF PETROLEUM WELL AND PETROLEUM REFINING EQUIPMENT

	1936			1937—9 months to Sept. 30		
	Petroleum and gas well-drilling apparatus	Other petroleum well and refining equipment	Derricks, except mining	Petroleum and gas well-drilling apparatus	Other petroleum well and refining equipment	Derricks, except mining
Total, to all countries	$8,762,253	$10,065,558	$69,872	$12,994,725	$12,946,151	$149,330
Venezuela	1,968,197	1,276,362	44,681	3,007,492	1,320,527	49,942
Netherlands India	1,626,465	573,429	.....	2,734,728	600,765	.....
Trinidad and Tobago	793,116	432,901	.....	1,122,100	764,704	7,664
Argentina	638,687	468,237	.....	567,118	1,076,829	.....
British India	479,414	81,339	.....	311,664	94,781	.....
Other Asia	472,524	589,865	8,341	238,654	1,180,867	.....
Colombia	372,184	299,281	2,474	508,280	297,668	59,594
Rumania	338,272	517,135	.....	1,252,917	339,671	12,514
Canada	297,322	146,550	1,817	972,301	273,692	2,037
Mexico	296,495	834,328	2,498	528,152	616,327	1,406
Russia	23,677	477,182	.....	.....	2,716,808	.....
Italy	472	1,022,434	.....	45,594	862,162	.....



Loading a 66.5-foot tower for shipment to an Italian refinery

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GB TWIN, 50 H. P.

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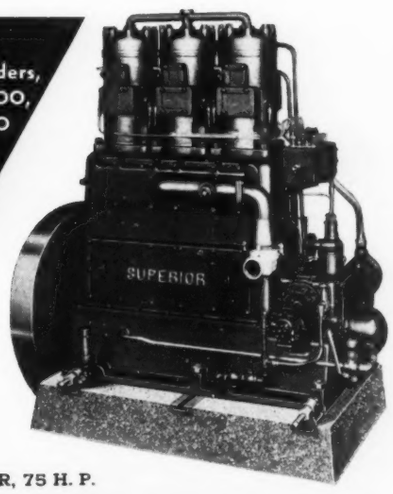
SIZES:
Two to six cylinders, 30, 50, 75, 100, 160 and 240 H. P.



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American oil-drilling machinery, in many parts of the Islands, but particularly in Java, Madura, and North Sumatra.

Trinidad and Tobago

Trinidad, location of the famous pitch lake, is also a substantial producer of crude petroleum, actually the largest in the British empire. Although participation in its oil industry is restricted to British companies, their use of modern equipment and technique offers a fair-sized market for American drilling machinery and refining equipment. An 18 per cent increase in crude production in the first nine months of this year over the same period in 1936 is probably the reflection of larger purchases of American equipment.

Argentina

A steady increase in production of crude petroleum in Argentina for several years, accentuated in 1936 and 1937 by extension of government control over all branches of the industry through Yacimientos Petroliferos Fiscales, has required many new drilling rigs, and much accessory machinery and refining equipment. This machinery, much of which originates in the United States, will continue to be bought in considerable amounts, but purchases in the future will be more and more for the Yacimientos Petroliferos Fiscales rather than for the private oil companies as in the past.

British India

Even in countries like British India and Burma, where production of petroleum is entirely restricted to Indians and British nationals, there is in use much American oil-producing equipment. Maintenance of this machinery and the necessity of handling production problems requiring special equipment make India a market for a sizable quantity of American oil well drilling machinery.

Afghanistan

"Other Asia" in United States export statistics includes Afghanistan, Nepal, Bhutan, Portuguese Timor, Macao, Goa, Damao, and Diu. Afghanistan is the area under this heading to which most of our petroleum equipment is shipped. Afghanistan did not assume importance as a potential producer of petroleum until the acquirement of extensive oil concessions at the close of 1936 by an American firm, and while years may intervene before there is commercial production of petroleum, meanwhile exploration, including drilling tests, will require oil-finding equipment, most of which will likely come from the United States.

Colombia

Tropical Oil Co., at present, sole commercial producer of petroleum in Colombia, drilled 45 new wells in 1936 in its two fields of Infantas and La Cira, several of which were well over 4,000 feet. Tropical's exports, at present limited by the capacity of the pipe line owned by the Andian National Corp., will likely increase as duplication of certain sections of the line and additional equipment authorized by government is added to present facilities.

Several new wells were put down by the Colombian Petroleum Co., increasing substantially potential crude production from the Barco concession. Exploratory work, principally geophysical and seismographic investigation, is being pushed by the Royal Dutch-Shell interests and various American groups interested in oil. Such have been recent developments in Colombia's petroleum industry which provided opportunity for the sale of American oil-drilling machinery and pipe line equipment.

Rumania

Much of Rumania's petroleum is produced and refined by the large international oil companies accustomed to efficient operation. Although less petroleum by 1 per cent was processed in 1936 than in 1935, the increase in production per meter drilled, coupled with reduction of losses in refining operations, indicates technical improvement traceable in all probability largely to increasing purchases of American drilling machinery and refining equipment.

Canada

Deep drilling in the Turner Valley field since the coming in of the Turner Valley Royalties well June 16, 1936, has brought rapid development of the limestone structures in Turner Valley and stimulated interest in oil finding in widespread sections of western Canada. Potential production by the year-end (1937) is likely to reach 25,000 bbls. daily. There is talk of building a cooperative pipe line costing $200,000 to High River to supplement the only existing outlet for Turner Valley operators—the line to Calgary—and there may be built a refinery at Calgary or High River. In fact two large oil companies are said to have the project definitely under consideration.

Mexico

Frequent suspension of operations due to strikes this year and uncertainty as to their future status in Mexico has probably curtailed equipment purchases by all private oil companies in that country. On the other hand, the National Petroleum Corp., government-controlled successor of Petromex, while still small, has steadily expanded operations. If the Mexican government continues its policy of increasing nationalization, and this seems likely, future purchases of drilling and refining machinery by the private companies will be limited to bare maintenance; moderate increases, however, will occur in requirements for the National Petroleum Corp.

Russia

Four or five years ago Russia was a substantial exporter of crude petroleum and refined products. With the growth in domestic consumption, exports have steadily dwindled and now it is realized that to meet internal demand there must be more efficient processing of the crude to increase the yield of refined products. Modernization of Russia's refineries has resulted in the placing in this country of large orders for a great variety of refining equipment, especially cracking stills, plant for treating lubricants, etc. Production of crude petroleum in Russia is suffering from insufficient modern machinery and lack of competent technicians, as is evident from failure to meet "plan" requirements. Appreciation of this situation should provide opportunities for the sale of American oil-producing equipment.

Recreation plays an important part in Colombia. Here is an El Centro recreation train

Italy

Italy lacks domestic supplies of petroleum but appears determined to build up a refining industry capable of meeting the home demand for refined products. To this end, government-controlled and privately operated refining capacity is being steadily expanded. Meanwhile, in order to be assured of adequate crude supplies, Italy is developing the petroleum deposits of Albania, carrying out intensive explorations in Ethiopia and seriously experimenting with hydrogenation at home.

Other Countries

While the countries referred to are the largest purchasers, there are numerous others which bought substantial amounts from the United States during the year. The more important of these, with their approximate takings from the United States for the first nine months, are: Egypt ($367,000); Iran (Persia) ($345,000); United Kingdom ($284,000); Canary Islands ($275,000); Peru ($257,000); Ecuador ($180,000); and British Malaya ($176,000). A long list of other areas bought smaller quantities.

Other Commodities

The figures given cover machinery and apparatus classified in our export statistics as directly used in the production and refining of petroleum, but it must be remembered that oil companies in foreign countries require vast quantities of other supplies from the United States, such as pipe, well casing, valves, motor trucks, tractors, machine tools, mechanics tools, steel of many kinds, belting, packing, foodstuffs and a host of other items aggregating enormous sums, though it is impossible to give an accurate statement of the total.

Export Sales Methods

Foreign selling of petroleum equipment differs in one important particular from that of most types of machinery, in that a heavy proportion of the machinery and supplies used by American-owned companies operating abroad is bought by the purchasing officers of these companies in New York or elsewhere within the United States, so that the domestic salesmen of the equipment manufacturers are generally in direct touch with the buyers. Indeed, it is sometimes the case that the first indication to the supplier that the apparatus is destined for export comes in the form of instructions on the order for special packing or marking the cases with a foreign destination. Most foreign-owned companies, however, do not have purchasing offices in the United States, so that the more successful of the American equipment exporters have found it desirable to have foreign sales representation, either by branch offices in the largest oil-producing countries, or by well-selected agents or representatives in these areas.

The presence of numerous American technicians among the employes of foreign-owned oil-producing and refining companies is an important factor in the preference accorded to American equipment. Sales campaigns should include provisions for keeping in close touch with such men.

The International Petroleum Exposition and Congress at Tulsa and the Oil-World Exposition, Inc., at Houston, convening in alternate years, attract representatives of oil companies from all parts of the world. The attendance of these men offers an excellent opportunity for sales promotion work.

Heavy Rotary Drilling Rig Used in Pechelbronn Oil Fields

By R. HOLLIER-LAROUSSE
Ingenieur de l'Ecole Nationale Superieure du Petrole de Strasbourg

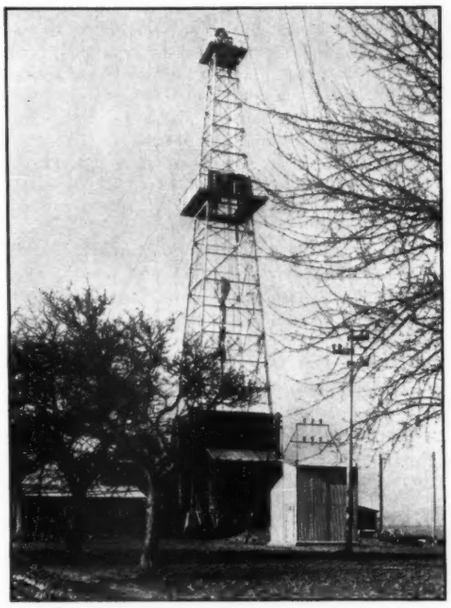
France, one of the heaviest petroleum consumers, has been a small oil producer. The only proven field in the metropolitan area, where researches on a big scale have just been started, is the Pechelbronn, in Alsace.

The Pechelbronn field, because of its operations having been the first in petroleum history; because of the special technique used to recover the liquid mineral, and because of the variety of products manufactured from its output—largely for the French market—is of lively interest.

The field borders the Alsatian plain lying north of Strasbourg, i.e., the middle part of the Rhine graben. It is 18 to 24 miles wide and 155 miles long. The depression was formed during the Oligocene period, and it is generally agreed that the oil belongs to that short period. It must be remembered, however, that hydrocarbons have been found recently in the Jurassic and the Keuper, in the southern part of the field. They might also belong to a period prior to the Oligocene unless they have migrated laterally through some important fault into a porous rock older than the formation now producing. These considerations induced the working company to begin, in December, 1936, deep drilling with a rotary rig.

Petroleum is found in long and narrow lenses, roughly parallel, forming some sort of sandy nuclei trapped in marl.

From a tectonic point of view, the field belongs to the rare monoclinal faulted type. Faults are en echelon, causing the strata to dip toward the middle of the basin.

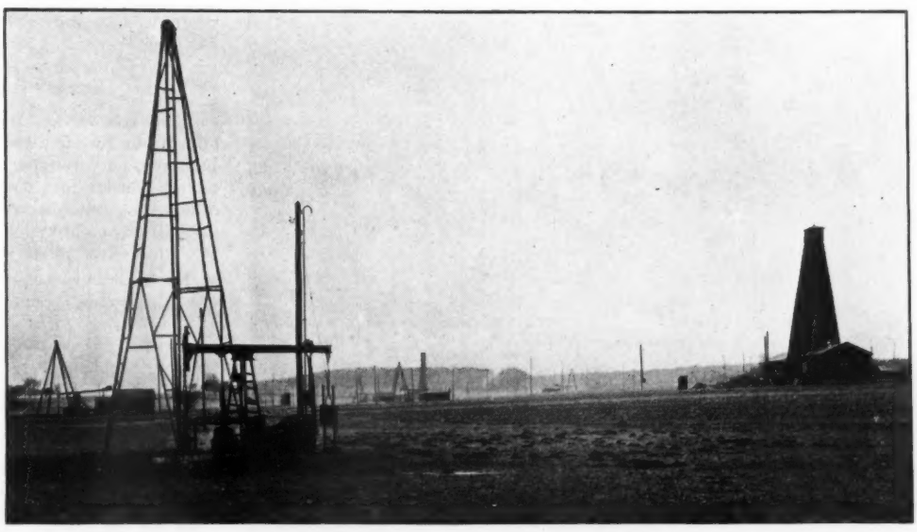


Rotary rig of United States manufacture drilling in Pechelbronn

History

The Pechelbronn field, known since the fifteenth century, has been worked regularly since 1735. The mine belonged to the Le Bel family, several members of which were celebrated chemists. They controlled the petroleum industry in Alsace for 154 years. The bituminous sands first were removed by means of shallow galleries. sunk from the hillsides, and afterwards from the bottom of shafts 300 feet deep. As the oil was very viscous, it could not be separated from the sand except by treatment with boiling water. It was chiefly used for manufacturing wagon-wheel grease. The wells, the first of which was drilled in 1813, were initially intended to explore the sands worked by galleries, their depth not exceeding 260 feet. In 1857, with the building of the first stills for producing kerosene, the refining industry made its appearance in France, and crude oil production was stimulated. In the meantime, Germany seized Alsace and Lorraine, and the field, after having been sold by the Le Bels to a local concern, became a German company property in 1906, remaining so till the end of the Great War.

In 1882 a deeper well met the pay at 460 feet. The gushing oil was more fluid. Efforts then were directed toward this new producing method, which entirely superseded galleries in 1888. Numerous small claims covered the district. They were to be united to form a mining property of some 108,000 acres, which the French government put in the hands of a receiver, according to the Versailles treaty, and leased afterward to the Pechelbronn Societe Anonyme d'Exploitations Minieres.



Pumping wells in the Alsation field

Present Production

Petroleum in Pechelbronn is produced by wells and mining galleries. The latter method, which already had been used in shallow workings, was resumed in 1917 to reclaim the large percentage of oil left underground.

The mean density of wells, in productive areas does not exceed 1.17 per hectare (about .46 per acre). More than 2,000 wells have been productive and have yielded a total of 1,550,000 metric tons (about 10,850,000 bbls.) of crude. The mean depth of wells is 1,213 feet, but a 3,200-foot drilling project is under way. Actually deep researches are just starting in Alsace, but interesting new showings seem to confirm the theory that in France deep well-protected strata contain hydrocarbons. The first well drilled with a rotary outfit was 4,328 feet deep in October, 1937.

The greatest depth for producing wells is 3,083 feet. The best one yielded daily over 70 cubic meters and a total of 30,000 tons (about 210,000 bbls). As a whole the field has yielded about one ton per meter drilled.

Gas pressure generally being low, the wells seldom are completed as gushers. The flowing life of wells is short. On the pump their average life is about seven years. Exploration of strata, first performed by mechanical coring, is now done by investigation of cuttings, together with the Schlumberger electrical coring method.

The drilling department has 850 workingmen. There are 38 rigs drilling, six of the cable tool type and one of the rotary type. Six hundred forty wells are on the pump, and in 1936 36,000 meters (over 118,000 feet) were drilled. The yield was 41,000 tons (about 287,000 bbls.).

The underground galleries furnish a recovery method which is peculiar to the Alsatian field. These regular mines seek in the sands the oil which has not been brought to the surface by pumping. Fifty per cent is reckoned as left in the strata by drilled wells, most of it being recov-

ered by the alternative method. The galleries make a system nearing a 200 meter density per hectare (265 feet per acre) for each level. The deepest levels are a little over 1,300 feet. Oil runs into sumps dug about every 30 feet. No strata of consequence can thus be missed. Wells give valuable geological information and serve as guides for directing galleries toward oil-bearing strata.

From 1917 to 1937 an area exceeding 2,900 acres was drained, the superimposed strata being reckoned separately and 149 miles of galleries being developed. Approximately 500,000 tons (about 3,500,000 bbls.) of crude oil was recovered, virtually the same quantity as by wells over an equal area.

The mine uses 850 working men. There are three mine workings. In 1936 a little more than 11 miles were driven, and production was about 30,000 tons (210,000 bbls.).

The three mine workings, a small distance from which a new one is being started, are less than 1½ miles from the refinery, on the oldest worked area, in the northern part of the claim. Some of the rigs are 12 miles from the refinery. Ninety-six miles of pipe line sends the oil extracted, partly dehydrated and rid of b.s., to the refinery, where it is stocked separately in tanks of 10,000-foot capacity. As a whole, the production of oil is reckoned between 490,000 and 525,000 bbls. for the past few years.

The refinery has been erected on the site of the first stills. There are three groups, covering an area of 6,000 acres. The annual capacity is 115,000 crude oil tons (805,000 bbls.) During 1936, in addition to the oil extracted from the French subsoil, some South American crude was run.

Plant Operation

The refinery is divided into three distinct parts, which, although adjacent, are situated on different village grounds, from which they derive their names: Lampertschloch, Merkwiller and Kutzenhausen. The Alsatian crude is stocked in the Lampertschloch division, where it undergoes a primary distillation—to obtain light products.

The oil from the wells and from the galleries—contains about 35 per cent salt water and earth in suspension. It is necessary, for insuring smooth-running distillation operations, to settle out those impurities. The oil first is held in tanks of 10,000 cubic foot capacity where mild heat is applied by steam coils. Then it goes in batches of 1,765 cubic feet to a set of insulated tanks where it is mixed with emulsion-breaking soaps. Then it is steam-heated.

The dehydrated hot oil passes first into a still of 1,500 cubic feet, where its temperature is gradually brought to 356/374° F. Here the raw gasoline is collected for chemical refining. The residue goes to a second similar still, where it is heated to 554/570° F., yielding kerosene distillate, which passes also to chemical treatment.

These two distillation runs have yielded about 35 per cent light products. The residue, called "65 residue" because it represents 65 per cent of the bulk treated, is sent to the Merkwiller plant.

The white product chemical refining is performed in Lampertschloch. Straightrun naphthas are treated in a continuous system by caustic solution, making them "sweet" and noncorrosive. Kerosene undergoes a sharp refining process before being marketed. That operation is done also in a continuous system, in five large agitators, lead-lined, of a capacity of 7,400 U.S.A. gallons, using in series sulfuric acid, caustic soda and clay.

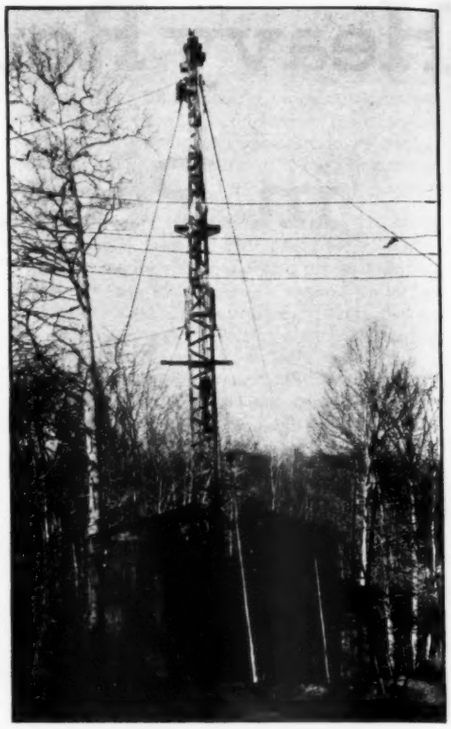
The 65 residue goes by the Lampertschloch pipe line to the Merkwiller plant for fractionating into lubes, paraffin wax, asphalt and coke.

A first distillation run separates the 65 residue into three cuts: Main distillate, containing crystalline paraffin; heavy distillate, containing so-called "amorphous" paraffin; more or less hard asphalt, according to reducing rate.

This first 65 residue run is performed under vacuum, with injected superheated steam. Five stills are operated continuously.

In nearby contiguous buildings — crystalline paraffin is separated from the main distillate by cold filtration at 5° F. followed by hot filtration, and finally by sweating in a slowly heated room.

So-called "amorphous" paraffin, trapped in a more viscous oil, cannot be satisfactorily extracted by the second process. Therefore the heavy distillate passes to the Kutzenhausen plant, where it is mixed with naphtha having a predetermined gravity, and then centrifuged. The naphtha then is distilled from the dewaxed oil and naphtha.



Type of portable drilling rig used in Pechelbronn

Raw paraffin, extracted by filtration and by centrifuging, is then refined in the Merkwiller plant by agitation with sulfuric acid and soda or clay. After a 158° F. filtration, paraffin is made into translucent slabs, packed and dispatched in 154-pound bags. Both main and heavy dewaxed distillates are redistilled under vacuum. Oils thus obtained undergo a sulfuric acid, soda and activated clay refining. Acid sludges are treated with steam for recovering 55° Be. acid, the solidified residue being used as fuel. Primary distillation yields a final asphalt product, with a melting point between 104 and 248° F. Some of the residue is cracked in special stills to obtain light products and coke for electrode manufacturing.

The refinery units manufacture all important petroleum products. The principal ones being kerosene, lubricating oils and paraffin. In 1936 Pechelbronn supplied 10.1 per cent of the kerosene, 12.5 per cent of the lubricating oils and 28.5 per cent of the paraffin needs of the French market.

Storing and Shipping

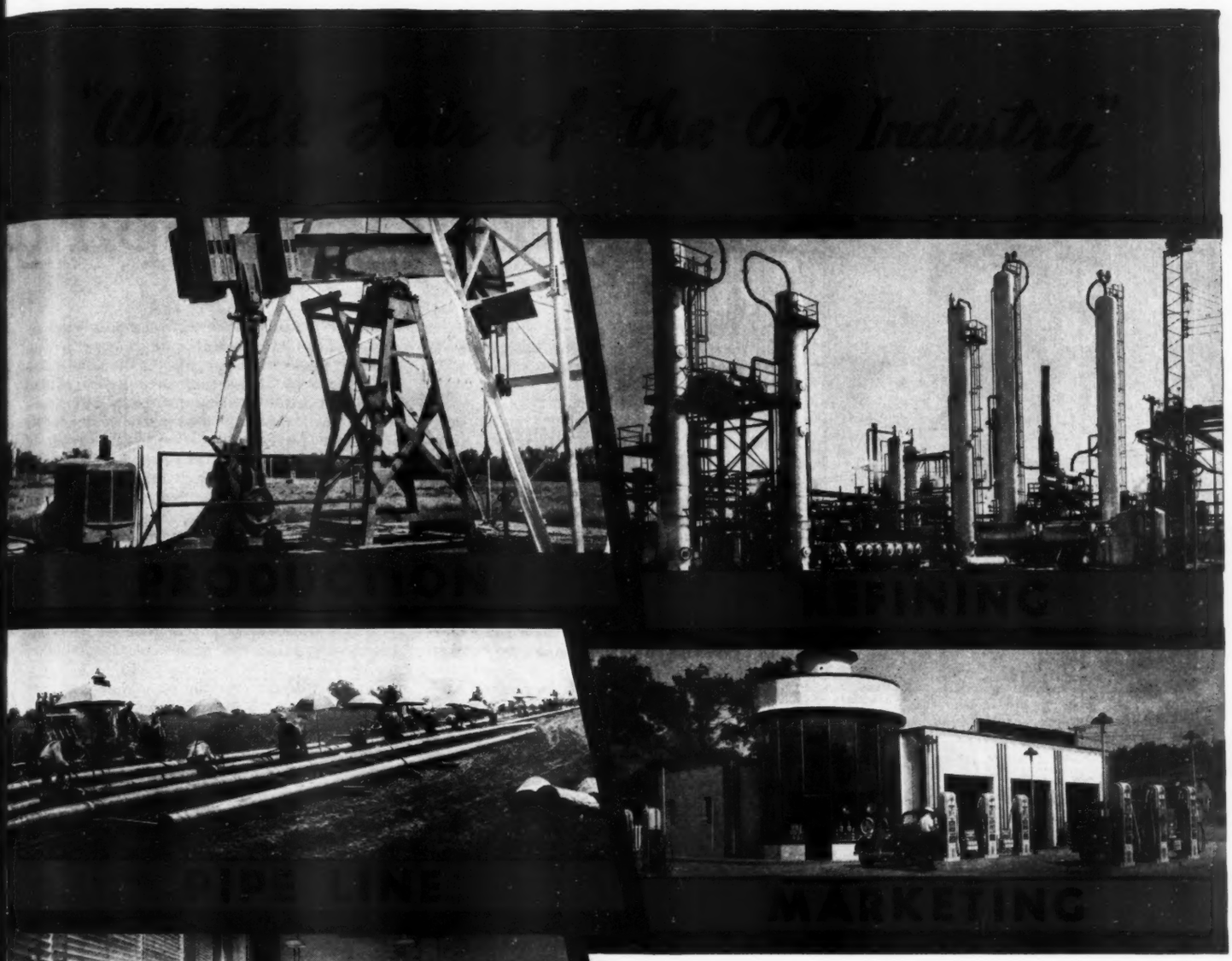
The Pechelbronn works possesses a great diversity of storing facilities, the big crude tanks having a capacity ranging from 2,000 to 5,000 cubic meters (70,000 to 176,000 cubic feet). About 240 others, distributed among the various plants, allow the building up of important stocks of finished and semifinished products.

No waterways being available near the refinery, all shipping is done by rail and tank-trucks.

Laboratories

Control and research laboratories, fitted according to the most modern methods, are housed in a building erected in the Merkwiller plant, opposite the main offices. The staff includes chemists, physicists, engineers and numerous helpers. In an experimental plant adjacent to the laboratories the oil may undergo any sort of treatment for high quality products under conditions similar to those used in the plant as it is now operated.

Enclosed rig in Pechelbronn



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TULSA, MAY 14-21, 1938
INTERNATIONAL PETROLEUM EXPOSITION

Japan Is Adopting Ex t
Policy in Developing C

One of the gushers in the Yatsuhashi district in Akita prefecture

By HERBERT LEOPOLD

With industrial control and secret protection by the military establishing themselves as a main feature of Japan's economic life, figures relating to the production, storage, importation and exportation of oil products for the past four months have been omitted in the monthly reports of the department of commerce and industry. However, it is most unlikely that startling data will emerge when the ban has been lifted. Production cannot be boosted within a short period to any large extent, and foreign trade figures can't be kept secret.

An item of real significance is the stock kept under the compulsory oil storage law of 1934. As will be remembered, Japan set a precedent in the history of oil when she compelled all importers of the product to keep in storage an amount corresponding to 50 per cent of their annual imports. It was only in the early part of 1937 that the measure began to work, after the Mitsui interests and other Japanese firms had agreed to take charge of the storage obligation of the foreign concerns, who had created an international issue through their refusal to comply with the regulation.

The number of large-capacity storage tanks constructed during the latter part of 1936 and all through the current year is not exactly known, but on the basis of a half-year supply, their combined storage capacity should exceed 63,000,000 cases, each case containing 9.5 U.S. gallons.

Indications are that Japan's wartime fuel economy will continue on the basis of the storage system rather than the productive end of the petroleum industry. The idea is that intensified drilling operations in the country would rapidly deplete the domestic flush reserves and leave the country without adequate supply in a real emergency. Another consideration is that advance supply of foreign oil for six months would be greatly discouraging the thought of an embargo.

Output of crude oil during the first six months by the Japan Petroleum Co. has remained practically the same as during the corresponding period a year before. Details are: (*Unit: "koku")

	1937	1936
January	192,789	161,369
February	172,157	145,751
March	182,964	172,719
April	175,295	170,609
May	182,034	178,433
June	176,347	147,317
Total	1,081,586	1,003,198

*1 "koku" equals 47.66 U.S. gallons.

According to the investigation of the Japan Petroleum Co., the supply of petroleum during the first six months of the year totaled 62,892 cases, recording an increase of 19.6 per cent over the corresponding period of the preceding year. Of the total supply, the local output (including oil refined from imported crude) amounted for 28,451,000 cases, or a gain of 31.3 per cent, and imports were 53,185,000 cases, up 67 per cent over 1936.

Gain in Gasoline

Taking gasoline alone, the supply amounted to 21,029,000 cases, an increase by 1,852,000 cases over the first fix months of 1936; 9,084,000 cases were refined from imported crude oil, and only 1,799,000 cases from domestic crude oil.

Akita and Niigata prefectures were again the main producing districts, with the former gaining and the latter declining in about equal proportions. Production in the Hokkaido, the northern island, further recorded a slight decline over the previous year. Formosan production, when seasonally adjusted, must be something like 1,700,000 U.S. gallons, the same as the year before. Formosan oil is produced for the main part from the natural gas which occurs in many districts of the colony.

All told, domestic production accounts for roughly 10 per cent of the entire oil demand, so that Japan depends on extra-imperial resources to the extent of 90 per cent. Although the Soviet-owned fields in North Saghalien are worked by Japanese the value of the concession has considerably decreased during the current year on account of political frictions. Also the much-mooted project of a Japanese concession in Dutch Guinea has failed to materialize during the year under review.

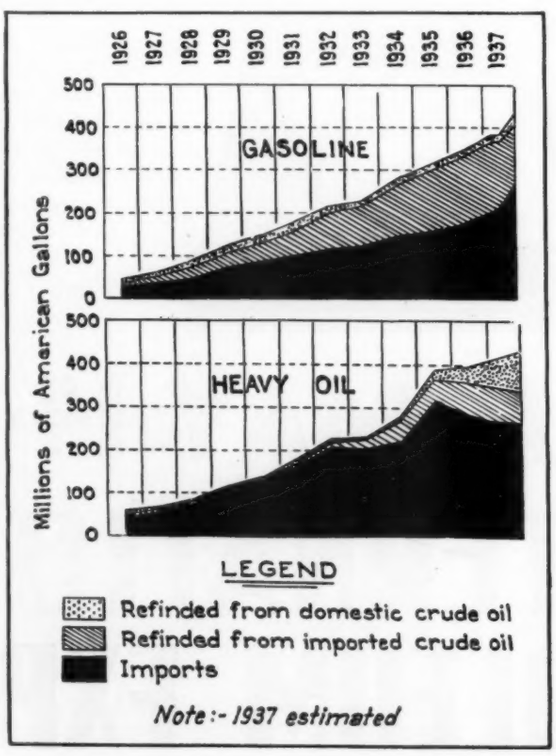
There are some graphs reproduced with this report to illustrate the remarkable advance that has been achieved by Japan's oil refining industry. Japanese stills and cracking plants have not only kept pace with the growing demand during the past few years, but they have been able to increase their market at the expense of processed oil imports.

Units for the treatment of imported crude are comparatively large, capacities exceeding 10,000 tons a month in many cases. On the other hand, crude oil from domestic wells is for the most part distilled in old-fashioned shell stills of smaller capacity. Prominent among the systems of the former type are the Foster Wheeler, Badger (a 500-bbl. vacuum unit recently installed), and N. N.C.; Kellogg and N.N.L. for heavy oil and lubricants; Dubbs, Cross, N.N.C., Ogura, Schulz and Gyro for cracking; and Smith-Leslie for gasoline distilling. The Dubbs system was introduced 15 years ago, being followed by other units in rapid succession.

Among the types of Japanese design, the N.N.C. cracking system of the Japan Petroleum Co. has made a conspicuous advance during the year under review, four units having been installed in Japan, one in Manchukuo for shale oil cracking, and one is said to have been shipped to Burma.

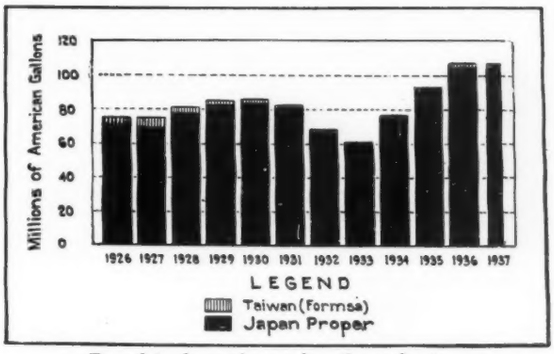
Writing in a recent issue of "Nippon Sekiyu Jiho" (Japan Petroleum Times), Masakichi Mizuta, a director of the Japan Petroleum Co., expresses the belief that the Japanese consumers will no longer be satisfied with gasoline of nice smell and color stability, as they have been in the past, but that octane number of the product is bound to become the preponderant sales argument.

For this reason the chemical refining methods (sulfuric acid and soda, plumbite, methanol soda liquor and resin soap washing) now prevailing in Japan will be ultimately replaced by physical refining methods as employed in the United States, he predicts. Developments in this direction have already been recorded during the current year.



Sources of Japan's gasoline and fuel oils

treme Nationalistic Own Supply of Oil

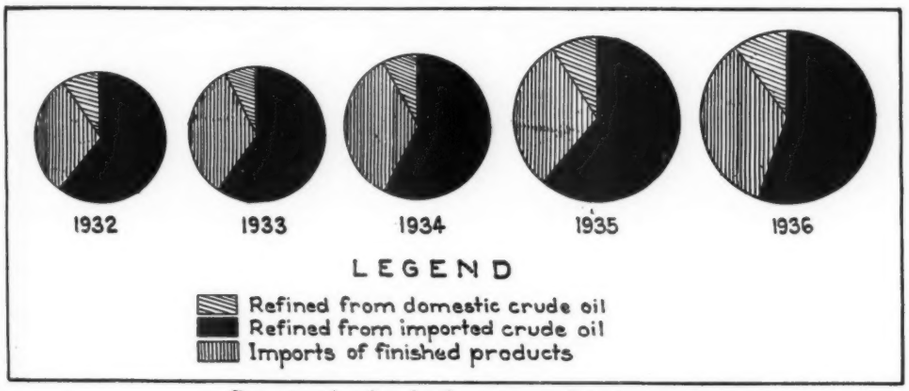


Trend in Japan's crude oil production (Only 6 mos. of 1937 shown)

Also fuel research in the period under review has been preoccupied with high-octane products. Outstanding among the developments is the anti-knocking gasoline prepared from Japanese crude oil by Dr. Nagai of the Aeronautical Research Institute, who obtained octane numbers up to 96. Masakichi Mizuta also continued his study about the crude oil of Formusa. From the crude oil, he separated aromatic hydrocarbons, from which xylenes were further separated. According to his analytical results, the xylene consists of 76.3 per cent mataxylene, 13.2 per cent para-xylene and 10.5 per cent ortho-xylene.

Kenichi Yamamoto studied the decolorizing characteristics of various absorbents in petroleum refining, and showed that these correspond to the empirical formula of Dr. Fruendlich.

Ryonosuke Kobayashi of the Tokyo University of Engineering carried out an extensive investigation into the ethyl effect, and concluded that highly antiknocking gasoline, particularly for aircraft engines, may be prepared by hydrogenation and desulfurization of gasoline.



Sources of refined oils consumed in Japan

Small Firms

Another feature of the current petroleum year is the spectacular advance of a number of small firms, whose overnight bid for oil power has created a sensation in Japanese business circles. As these firms have become a factor on the international market, a brief sketch of their respective background may be of interest.

One of these newcomers is the Hayama Petroleum Co., which originated in 1935, when the private enterprise of Yosaburo Hayama, who at present heads the concern, was organized on a joint-stock basis. In 1930 he had secured a lot in the waterfront area of Tsurumi, where a refining plant of his own design was erected. Business was boosted through a sales contract with the powerful National Purchase Cooperative Federation. In 1934, Nobuteru Mori, keyman in Japan's electro-chemical industries, proposed affiliation with his "Konzern," gave 6,000,000 yen to establish the Hayama Petroleum Co., Ltd. In 1935 the firm was incorporated with headquarters in Marunouchi, Tokyo. Mr. Hayama assumed the chair. The firm has already branched out into investment activities and is the guiding power behind the Sekiyu Rengo K.K. (United Petroleum Companies, Ltd.).

The Ogura Petroleum Co. was founded by the late Tsunekichi Ogura, a vegetable oil trader, who went into drilling during the Echigo oil boom of 1899. He was one of the earliest to send his men to the United States to study piping, storing and selling. Later he originated the rotary drilling system of Japanese type, which since has established itself as the standard system in Japanese oil fields. When, during the World War, the rising demand for oil suddenly outgrew the capacity of Japanese wells, he took up the import business. In 1925 the firm was organized on a joint-stock basis with a capital of 10,000,000 yen, recapitalized to 20,000,000 in 1927. The Tokyo plant was equipped with a Jenkins cracking unit; later a Kellogg plant was added. In more recent years the firm has built up an efficient tanker fleet. Ogura Petroleum headed all others during the current year in the construction of storage tanks, most of which have a capacity of 15,000 tons.

Aikoku Petroleum Co. originated in 1934, when it was started as a private enterprise with the modest capital of 100,000 yen. In January, 1937, the capital was increased to 5,000,000 yen. The company last July placed in operation a cracking and topping plant. The firm imports crude oil from California.

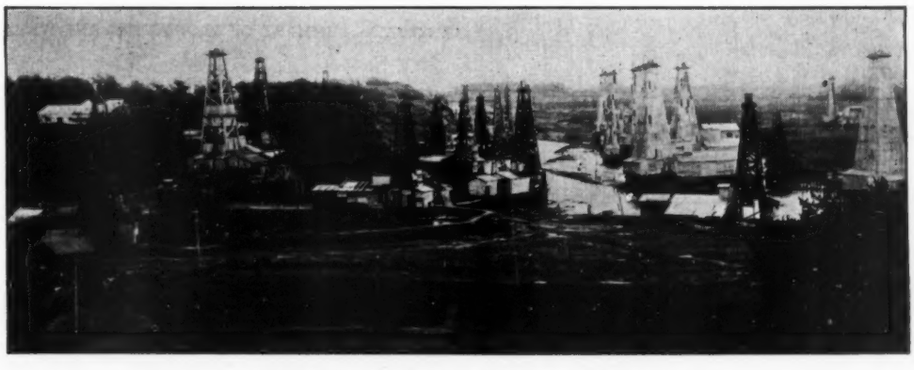
Toyo Shoko Petroleum K.K. is primarily engaged in the manufacture of high-grade lubricants, being in business since 1933. Yurei Nakano, of chemical fame, last year acquired the controlling interest in the concern, which since has increased its scope by leaps and bounds.

Nichi-bei Koyu K.K. (Japan-American Mineral Oil Co., Ltd.), of Osaka, is an older organization, its business dating from 1898. Last July, another recapitalization was undertaken, the share capital being now 1,000,000 yen. Importation of crude oil is done through a subsidiary, the Fuji Trading Co. (capital 50,000 yen). Nichibei Koyu for the first half of the current year realized a net profit of 29.1 per cent against the paid-up capital.

Coal Liquefaction

No discussion of the oil situation in Japan is complete without mentioning the coal liquefaction industry, which has developed under strong government protection. For some time, emphasis was placed on petroleum substitutes, such as charcoal gas, producer gas and alcohol, but latterly interest has been transferred to coal liquefaction and shale oil distillation. It should be noted that complete self-sufficiency in liquid fuels is by no means aimed at, but that according to the present plans only the natural increase in demand is to be supplied by liquefaction plants. For instance, it is estimated that the demand for liquid fuels in 1943 will be in the neighborhood of 5,000,000 tons, against roughly 3,000,000 tons for 1936. It is hoped that in that year the liquefaction industry will have attained a capacity of 2,000,000 tons.

The most important news development in this connection is the establishment of the 100,000,000-yen Teikoku (Imperial) Fuel Co. last September by virtue of a special government charter. According to the prospectus, the company will need about 770,000,000 yen to obtain an annual production of 1,000,000 hectoliters each of gasoline and heavy oil in 1943 (or roughly 2,000,000 tons in terms of weight). Contrary to the Japanese com-



Wells in the Yatsuhashi district of Japan

mercial code, the company may increase its capital even before the shares are called in for the full amount. The business of the company is strictly limited to investment in producing concerns, no production being contemplated under its own management. An annual dividend rate of 4 per cent (1937-39) and of 6 per cent in subsequent years is guaranteed by the Japanese government.

The artificial petroleum products will be exempt from consumption tax, and state subsidies may be granted to make up for the difference between the costs of production of natural oil and the artificial product.

It is intended to draw on the coal resources of Manchukuo and North China, as Japanese collieries are incapable of supplying the huge quantities required for the undertaking. The present military operations in China are not without significance in this connection.

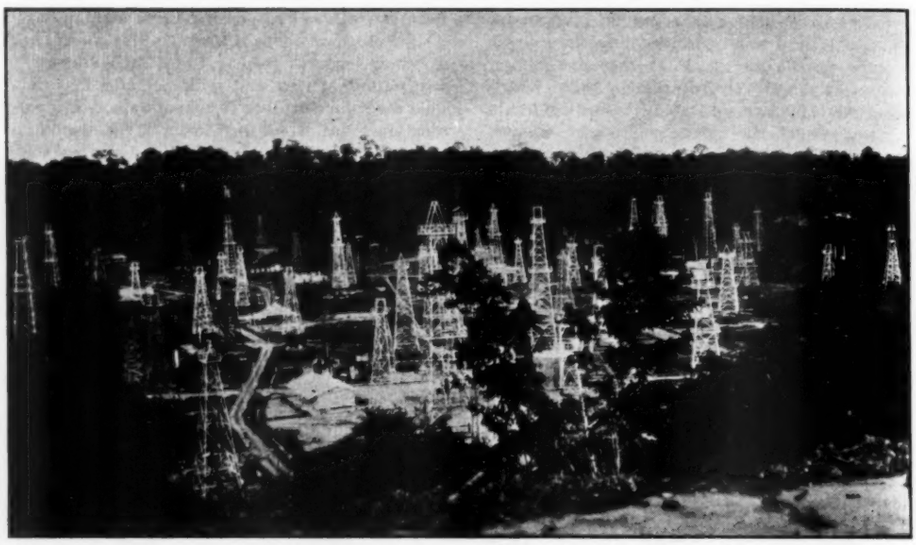
The Mitsui interests have already installed a Fischer unit in Ohmuta, Kyushu island, where experimental production of gasoline will be started early next year. Mitsui leaders have planned to form the Mitsui Coal Liquefaction Co. with a capitalization of 20,000,000 yen.

Also the Mitsubishi group has been busy in this direction. A liquefaction plant with a daily capacity of 5 metric tons has been in operation since the latter part of 1936, and encouraging results are reported.

Despite the shift of emphasis in its fuel policy to coal liquefaction, the Japanese government has not relaxed in its efforts to promote the production of petroleum substitutes. At the end of 1943 Japan will have 80 government-controlled alcohol plants of which seven will be ready for operation at the end of this year. The alcohol monopoly bill, which was passed by the Diet early this year, requires that domestic refiners and importers of gasoline mix a certain percentage of fuel alcohol with the gasoline, the percentage ranging from 3 to 20 per cent.

J. A. CLARK
General Field Superintendent
Lago Petroleum Corp.

OIL FIELD ON TARAKAN ISLAND, EAST INDIES



An unusual appearing oil field on the Island of Tarakan, which is approximately one-half the size of Trinidad and is situated off the northwest coast of Borneo. There are about 700 wells in the field, and it can be seen the derricks over the wells are all of different heights. This is because there are either 13 or 14 different producing horizons at various depths which range in thickness from 3 to 12 meters. Most of the wells are rather small pumpers, but they produce very light oil.

VENEZUELAN CRUDE OIL PRODUCTION IN 1937 20 PER CENT HIGHER THAN YEAR AGO

The output of crude in Venezuela for 1937 will reach an estimated total of 186,961,000 bbls., a daily average of 512,222 bbls. a day or a 20.24 per cent increase over 1936, and approximately 9.17 per cent of the world crude oil production. Comparison of production for the past seven years follows:

Year—	Total	Daily average	Per cent of world
1930	136,987,662	375,368	9.64
1931	118,878,971	325,696	8.65
1932	118,110,000	322,705	9.02
1933	120,442,000	329,978	8.35
1934	136,361,000	373,592	9.00
1935	148,889,000	407,915	9.01
1936	155,913,000	425,992	8.68
1937*	186,961,000	512,222	9.17

*Estimated.

Venezuela remains third in rank of producing countries. For the first time the yield averaged over 500,000 bbls. daily. However, its share of the world total production is still below what it was in 1930.

The accompanying table gives a comparison of production by fields for 1936 and 1937, with total production to date, and the well situation as of October 1, 1937. Although no new fields were placed in commercial operation, the contributing factor in the increase of output was the initiation of regular production in the Tia Juana field in Lake Maracaibo. This area, discovered March 1, 1928, was closed in, waiting for a market. Due to increased foreign demand and the natural decline in older fields it was necessary to bring this area into regular exploitation early in 1937.

VENEZUELA—SUMMARY OF PRODUCTION AND WELLS

	1936		1937			Well data as of October 1, 1937								Wells completed Jan.-Sept. 1937
	Total production	Daily average	Total production	Daily average	Total to end of 1937*	Wells drilling	Nat. flow	Gas/air lift	Pumping	Closed in	Inactive	Abandoned	Total wells drilled	
Ambrosio	1,802,133	4,924	1,689,988	4,630	25,423,782	..	1	..	80	6	23	15	125	..
La Rosa	15,765,977	43,076	16,279,578	44,602	266,250,601	4	95	61	389	61	261	39	906	10
Benitez	3,754,134	10,257	6,919,016	18,956	23,122,230	1	58	9	3	42	25	6	143	39
Tia Juana	77,907	213	26,710,372	73,179	26,818,139	9	173	..	3	22	1	1	200	176
Lagunillas	85,837,480	234,529	84,794,356	232,313	753,356,213	4	256	80	414	46	224	26	1,046	75
Others	10,349	28	20,755	57	66,318	1	..	..	..	8	1	..	9	3
Total Lake fields	107,247,980	293,027	136,414,065	373,737	1,095,037,283	19	583	150	889	185	535	87	2,429	303
La Paz and Concepcion	1,379,474	3,769	1,366,584	3,744	23,114,945	..	4	..	56	..	72	3	135	..
Tarra and Los Manueles	4,612,827	12,604	4,187,269	11,472	45,254,983	..	12	..	21	4	46	15	98	2
Mene Grande	15,633,735	42,715	14,383,409	39,407	185,485,432	4	57	51	15	28	151	16	318	13
El Mene and Media	862,178	2,356	719,597	1,971	23,311,475	2	2	39	41		102	138	322	6
Cumarebo	2,794,150	7,364	2,571,588	7,045	19,256,159	1	36	..	9	22	25	14	106	13
Quiriquire	23,176,866	63,325	25,920,460	71,015	98,830,134	5	138	..	27	33	11	15	224	41
Pedernales	143,251	391	1,350,178	3,699	1,558,434	3	7	..	..	1	..	4	12	4
Others	62,545	171	47,732	132	3,570,216	1	..	..	10	39	..	102	151	..
Total Venezuela	155,913,006	425,992	186,960,852	512,222	1,495,419,061	35	839	240	1,068	312	942	394	3,795	382

*Partly estimated.

Increase in Tia Juana Area Outstanding in Venezuela

By H. STANLEY NORMAN

Chiefly responsible in boosting Lake Maracaibo Basin production in particular and Venezuelan production in general to record heights in 1937 was the Tia Juana field, between Lagunillas on the south and La Rosa-Ambrosia (Cabimas) on the north. From a total 1936 output of 80,284 bbls., the Tia Juana field finished 1937 producing at the rate of approximately 3,775,000 bbls. of heavy, tar asphaltic base crude oil per month. The spectacular rise of production from Tia Juana was made possible by intensive development programs carried on since March by Venezuela Oil Concessions, Mene Grande Oil Co., and Lago Petroleum Corp., the three concession holders in the proven productive portions.

Although new in exploitation, the Tia Juana field has been known to exist since 1928 when a series of staggered locations were drilled by Mene Grande Oil Co. (then known as Venezuela Gulf Oil Co.) and Lago Petroleum Corp., a subsidiary of Standard Oil Co. of New Jersey.

In most respects, Tia Juana is comparable to other Lake Maracaibo fields, excepting that the shallow sands, ranging from 2,250 feet to more than 3,450 feet, produce crude of higher viscosity and lower gravity than the average for fields previously exploited. The initial producing ability of wells ranges from small pumpers of 50 to 75 bbls. per day up to natural flowing wells capable of yielding more than 2,500 bbls. through small chokes on tubing. Pressures show almost as wide range of fluctuation as the producing ability, depending on structural position, and with reference to previous exploitation and production.

Production in Lake Area

All of the submerged acreage in the Tia Juana field—that is productive portions of the structure extending under the deep waters of Lake Maracaibo—is held under concession by Lago Petroleum Corp., with exception of a shoreline strip 1 kilometer wide. The strip is owned by Mene Grande Oil Co. Venezeula Oil Concessions' property extends from the east edge of Mene Grande concession inland several miles and well beyond the indicated productive limits in that direction.

Since the intense development program was launched in March, the three concessionaires had drilled and completed more than 200 wells to the end of November. Remainder of the field's approximately 235 total wells were drilled in 1936 and preceding years dating back to the discovery well completion March 10, 1928. There has been a slight recession in development since mid-summer due to slackening in demand for this particular grade of crude.

A big majority of 235 completed wells in the Tia Juana field have flowed naturally, but heavy withdrawals from the reservoir during three-quarters of the year have reduced pressures in certain local areas. Existing pumping wells were small on completion. The south end of the Tia Juana structure has been partially defined by wells drilled into water which definitely establish a non-productive territory dividing the field from Lagunillas. Intrusion of water into the more densely drilled portions of the Tia Juana reservoir has been exceptionally slow in view of the pressure decline and the volume of oil withdrawn. Tardiness of water intrusion is partially explained by local faults present at numerous points. The

Production Record

The production record of the Tia Juana field up to 1937 is shown below:

Company—	1928	1929	1930	1936
Venezuela Oil Concessions	.....	.....	.....	39,098
Lago Petroleum Corp.	9,468	12,555	.....	41,186
Mene Grande Oil Co.	549	.....	5,040	....
Totals	10,017	12,555	5,040	80,284

1937 Production

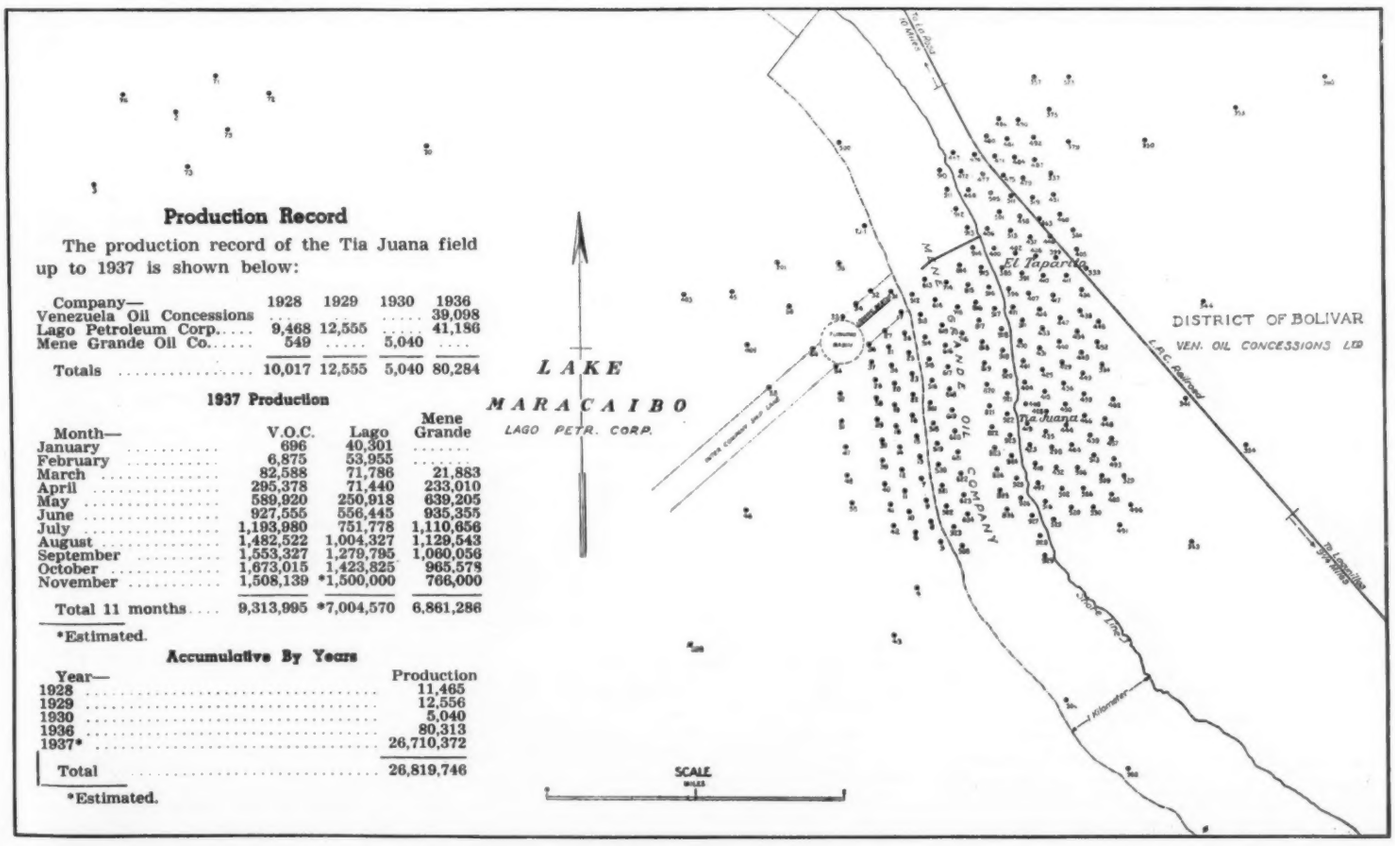
Month—	V.O.C.	Lago	Mene Grande
January	696	40,301	.....
February	6,875	53,955	....
March	82,588	71,786	21,883
April	295,378	71,440	233,010
May	589,920	250,918	639,205
June	927,555	556,445	935,355
July	1,193,980	751,778	1,110,656
August	1,482,522	1,004,327	1,129,543
September	1,553,327	1,279,795	1,060,056
October	1,673,015	1,423,825	965,578
November	1,508,139	*1,500,000	766,000
Total 11 months	9,313,995	*7,004,570	6,861,286

*Estimated.

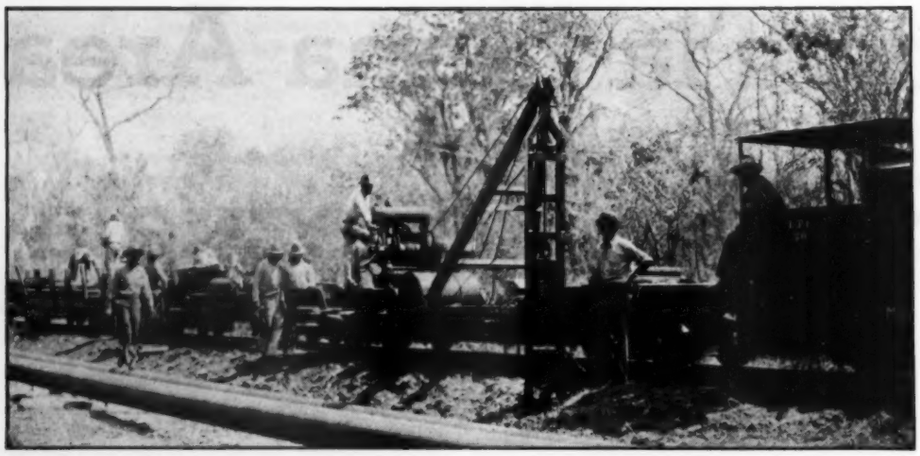
Accumulative By Years

Year—	Production
1928	11,465
1929	12,556
1930	5,040
1936	80,313
1937*	26,710,372
Total	26,819,746

*Estimated.



Map of Tia Juana area



Driving pipe stakes in Tia Juana field, Venezuela, to prevent crude line on the railroad fill from skidding

frequent occurrence of local faults also restricts movement of oil within the reservoir and this is advanced as one explanation for the apparent rapid drops in pressure in certain portions.

There is practically no free gas present in the structure, but an abundance is held in solution contributing to a difficult operating condition which has been solved satisfactorily by special handling. Viscosity of the crude is so high, averaging 5,978 seconds at 85° F., that liberation of gas from solution is retarded and, coupled with other physical characteristics, creates a "foam" in storage, making gauging and storage tank arrangement troublesome. It is, or rather was, not uncommon to overflow a storage tank when it actually contained no more than half capacity of crude oil due to accumulation of "foam" above the liquid level. By adjusting tank switching schedules and by various heating arrangements the operators have been able to solve these problems.

In the case of Venezuela Oil Concessions individual gas-fired heaters are installed on each flow line only a short distance from the well head. Other operators employ steam coils in the bottom of accumulating tanks warmed by exhaust from pump station engines, but not to exceed 130° F.

The middle portion of the Tia Juana field has been drilled to its patterned density for a width of more than 3 kilometers and the current activity by V.O.C. and Mene Grande is extending toward the north. Mene Grande is engaged in protecting its line against V.O.C. drilling on the eastern boundary of its concession and vice versa. Lago is currently confining its Tia Juana drilling program to step-out locations extending production deeper into the lake bed. So far there is no indication of the field's western limits—to the lakeward side. Lago drilled two wells, one in 1936 and one carried over for completion in 1937, about 5¾ kilometers and 7 kilometers, respectively, from the lake shore line and obtained sizeable producers in both. It is regarded not improbable in light of present knowledge, that the lake bed will prove productive several kilometers from the shoreline for almost the entire length of the Tia Juana field. The wells removed from the lake shoreline to which reference was made above were Lago Petroleum Corp. No. 2 and No. 3 Tia Juana. No. 2 was completed in August, 1936, at the plugged back depth of 3,325 feet for initial of 1,200 bbls. of 24.70-degree A.P.I. gravity production per day. No. 2 producer is 5¾ kilometers from the nearest shoreline point. Lago No. 3 Tia Juana, 7 kilometers from the nearest shoreline, and farther west in the lake bed, was completed February 5, 1937, at total depth of 3,445 feet for initial production of 1,375 bbls. of 22-degree A.P.I. gravity crude through seven-sixteenths inch choke.

The Tia Juana field was discovered by Lago Petroleum Corp. No. 1, completed at 2,480 feet March 10, 1928, for 1,176 bbls. through three-fourths inch choke. As is characteristic of the upper tar sands nearer the shoreline, the discovery well's production tested 15.9-degree A.P.I. gravity. Drilling without benefit of previous logs as it was in the discovery well, Lago set four strings of casing in No. 1 Tia Juana, a program which has been simplified to not more than two strings of pipe plus a screen or perforated liner with tubing. One of the operating companies is drilling and completing Tia Juana wells without landing a surface string of casing. Lago drilled five additional wells in 1928, 1929 and 1930. The next drilling by Lago in the Tia Juana field was delayed until 1936 when No. 2 and No. 3 Tia Juana were drilled to the west in the lake bed. The delay was because of demand conditions and ample production being available from other lake fields. Then, too, time was required to make the physical preparations for the exploitation campaign launched on a major scale in the second quarter of 1937.

Lago Discovery Well

After completion of Lago's discovery well, Mene Grande Oil Co., under name then of Venezuelan Gulf, launched six exploratory tests through October, 1930. Mene Grande started numbering its wells in the Tia Juana field at 500 to distinguish this block (Rodriguez 5) from a Rodriguez block 4 in the La Rosa field to the north.

Mene Grande first well, No. 500 Rod., was completed at 2,255 feet July 23, 1928, for natural production of 63 bbls. of 12.5 degrees Baume gravity oil through 4-inch flow line. Both the upper and lower tar oil zones were opened in Mene Grande's first well. The second Mene Grande well, No. 501 Rod., was more representative of the fields average developed during 1937. It was completed November 25, 1928, at 2,628 feet for natural flowing production of 800 bbls. daily of 15 degrees Baume gravity through seven-eighths inch choke. The second well was also completed with both tar oil zones exposed. Mene Grande No. 503, the third test drilled by the company, gave additional information on structural conditions. Although its initial performance of pumping 75 bbls. daily of 22.6-degree A.P.I. oil was not particularly satisfactory, it did establish presence and productivity of the La Rosa sand. The well was drilled to total depth of 3,312 feet and 8⅝-inch casing was set at 3,210 feet, through both tar oil zones which under this location carried water.

During early exploration, Mene Grande's largest producer was No. 505 Rod., which flowed 2,442 bbls. of 15.8-degree A.P.I. gravity from a plugged back total depth of 2,740 feet, and through five-eighths inch choke. Southern limits of the productive area were partially established in October, 1930, when a step-out well of Mene Grande Oil Co., drilled at the north end of the Lagunillas, failed to obtain production in the upper and lower tar oil zones or the La Rosa sand to a total depth of 3,293 feet.

Lago has also apparently established the southern productive limits of its portion of the Tia Juana field in No. 208 T. J. which showed water with only a trace of oil in drilling to 3,496 feet in April, 1930. Venezuela Oil Concessions started its first Tia Juana field operation in January, 1936, and completed it as a producer in February. V.O.C. initial producer was No. 398 which was drilled to 2,694 feet opening both tar oil zones and the La Rosa sand for production of 258 bbls. daily of 12.9-degree A.P.I. gravity crude. One string of tools was continued in service throughout 1936 by V.O.C., the year ending with 16 producers to the credit of the company. Offset requirements, threat of drainage and a strong market for the heavy tar oil were factors influencing Mene Grande and Lago to enter the exploitation campaign early in 1937. With as high as 12 to 18 strings of rotary tools operating simultaneously for part of the time from March, or at least through October the output climbed rapidly. Unless mechanical delays interfere, one string of rotary tools can complete approximately two wells per month in Tia Juana. Up to the end of October, Venezuela Oil Concessions had completed 108 producing wells in the field, Mene Grande, 65 and Lago Petroleum Corp. 62, for a grand total of 235. Currently there are approximately 10 rotaries engaged in Tia Juana development.

With the exception of Meno Grande's arrangements, the movement of production from Tia Juana follows conventional Lake Maracaibo practice of flowing or delivering oil to land storage where it is gauged and loaded directly to lake tankers over a jointly used loading jetty by V.O.C. and Lago, extending lakeward from the heart of the field. Mene Grande Oil Co. produces its oil into two 55,000-bbl. tanks on land where it is picked up by pump station and run through a newly constructed 12-inch welded line north to Cabimas into the company's tank farm where tanker loading facilities are maintained. The line is approximately 12 miles long and operates at a pressure of 750 pounds. Steam driven reciprocal pumps are used at the field end. It is from the pump station engines that exhaust steam is drawn for use through heating coils in the bottoms of Mene Grande's field storage tanks when needed to reduce viscosity.

Crude Analysis

Analysis of a typical sample of Tia Juana crude:

Inspection—	
Gravity, A.P.I.	15.6
Viscosity at 85° F.	5978
Viscosity/100° F.	2891
Viscosity/122° F.	1273
Viscosity/210° F.	142
Flash, P-M, degrees F.	146
Flash, OC, degrees F.	190
Fire, OC, degrees F.	295
Pour, degrees F.	+15
Color	dark brown
Per cent sulfur, B	2.41
Per cent water and sediment	trace

Yield summary—		Per cent
Light blend. dist.	over 392° F.	2.1
A.P.I. gravity	48.2	
Sulfur, L	0.18	
Heavy blend. dist.	392-428° F.	1.5
Gravity, degree A.P.I.	38.4	
Light gas dist.	428-518° F.	7.5
Gravity, degree A.P.I.	32.8	
Percent sulfur L	0.48	
Bottoms		88.6
Viscosity/210° F.	251	
Gravity, degrees A.P.I.	13.6	
Pour, degrees F.	+30	
Per cent sulfur, B	2.59	
Per cent carbon residue	10.0	
Loss		0.3
		100.0

Refining Cracked Gasoline From Oil Produced Outside of U.S.

By J. C. MORRELL, C. G. DRYER and GUSTAV EGLOFF
Universal Oil Products Co.

The importance of the problem of refining the gasoline produced from the crude oils throughout the world is indicated by the fact that 1,742,000,000 bbls. of crude oil were processed in 1936 to supply the gasoline requirements for the motor vehicles of the world. During the same year the cracking process required 786,000,000 bbls. of oil yielding 303,452,000 bbls. of high antiknock gasoline. This is exclusive of the polymer gasoline which, during 1937, will be produced at about the rate of 10,000,000 bbls.

The present paper deals with the refining of cracked gasolines from crude oil sources obtained from the most important oil producing fields of 13 foreign countries.

The present tendency in refining in the United States is toward the elimination of any treatment which is not necessary to the essential quality of the motor fuel. Thus acid treatments are largely eliminated where gum forming tendencies may be overcome by the addition of inhibitors. Large quantities of gasoline are being marketed with sulfur content of 0.3 per cent and higher without any deleterious effects upon the motor.

Methods of Treatment

The methods of treatment employed in the refining of these gasolines include doctor sweetening alone and combinations of sulfuric acid treatment and sweetening as well as vapor phase adsorbent refining treatment.

The simple acid treatment consisted in agitating the distillate with 66° Be. sulfuric acid, neutralization with caustic soda and redistillation with fire and steam. The split plumbite treatment is the one described on many occasions by the authors wherein the distillate is subjected to plumbite treatment before and after the sulfuric acid treatment with intermediate water washes and then redistilled with fire and steam. The gasolines are susceptible to other types of treatment such as clay treating; the removal of light gasoline, boiling up to approximately 250° F., which requires very little treatment, e. g., sweetening only, and the removal of a side cut for more drastic treatment with acid as described. The gasolines were sweetened with plumbite solution in the usual manner. Inhibitors were added to those gasolines which were simply sweetened as well as the treated gasoline for added stability to prevent gum formation in storage and to avoid reduction in knock rating. It is of course desirable and conforms with the present trend, to eliminate acid treatment wherever possible in view of the actual loss of gasoline and depreciation as a result of loss in octane number.

The following methods for refining are described in connection with their application in the laboratory for testing purposes, but the principles are equally applicable in plant practice.

Sulfuric Acid Refining

A. *Simple sulfuric acid-caustic method:*

1. 1,900 cc. of the moisture free distillate is agitated with the required amount of sulfuric acid for 30 minutes in the agitator. The distillate is maintained at 40° F. and the temperature of the oil charged is recorded.

2. The treated oil is settled for 15 minutes at 40° F., the flask removed from the stirrer and the oil decanted from the sludge. The sludge is poured into a graduate, allowed to drain, and settled over night. The oil recovered is measured and the temperature recorded.

3. The decanted oil is washed in a separatory funnel with two portions of water equal in volume to the gasoline. Each portion is shaken five minutes. Ice is used in small quantities to minimize the loss of volatile hydrocarbons. The water is withdrawn from the funnel.

4. The oil is treated with 3 per cent by volume of 16° Be. caustic by shaking vigorously for five minutes and allowed to settle until there is no emulsion in the bottom and the caustic withdrawn.

5. The water washing is repeated as under 3, water separated, and the gasoline rerun with fire and steam.

B. *Simple acid-plumbite method:*

The same procedure is followed as for the simple acid caustic treat with the following exception: 16° Be. plumbite is used instead of caustic together with the addition of sulfur to complete the sweetening reaction.

C. *Split plumbite method:*

1. The oil is agitated for five minutes with 3 per cent by volume of 30° Be. plumbite in a separatory funnel, settled for 15 minutes and the plumbite withdrawn.

2. The oil is washed with water as described in section 3 of method A.

3. The oil is dried by filtering or by the use of 1 pound per barrel of 93 per cent sulfuric acid. If acid is used, shake for two minutes. The remainder of the procedure is the same as outlined in method B.

4. Follow the complete procedure as outlined in method B.

D. *Split caustic method:*

The same procedure is followed as for the split plumbite treatment with the following exception—caustic is used in both cases instead of plumbite.

Note in some instances, i. e., kerosenes, that the filtered oil does not need rerunning.

Manufacturing motor fuels of high octane number and high quality generally has become a world-wide problem. The nature of the crude from which these motor fuels are to be made determines the method of refinement and the characteristics of the products. Here, the authors have outlined the refining of cracked gasolines made from crude oil produced in Russia, Venezuela, Rumania, Iran, Sumatra and Mexico. In an early issue the same data will be supplied on crudes produced in Iraq, Argentina, Canada, Bahrein Island, Dutch East Indies, Greece and Japan.

Rerunning the Refined Oil

The volume of neutralized oil charged to the rerunning apparatus is recorded and heat applied to the flask until the temperature reaches 220° F. Superheated steam is allowed to enter the flask, and the temperature of the oil raised as rapidly as possible to 350° F., where the distillation is maintained. The percentage required to make the de-

(Continued on Page 104)

TABLE 1—MOTOR FUELS OBTAINED FROM RUSSIAN CRUDE OILS

	Cracking stock								
	Russian gas oil — Ural Mountains (Bashkis)					Russian naphtha Ural —Mountains—		Russian naphtha & gas oil, Ural Mountains (25% naphtha) (75% gas oil)	
Properties of cracking stock—									
°A.P.I. gr., at 60° F.	26 4					50 4			
Total sulfur, per cent	2 57					0 85			
Octane number	....					38			
Treatment of cracked gasoline—	None	Doctor	—Split plumbite†—			None	Split plumbite†	None	Split plumbite†
Acid, lbs./bbl.	....	....	12	12	16	....	4	....	10
Acid solution loss, per cent	....	....	3.2	2.5	4.4	....	0 8	....	3 0
Polymerization loss, per cent	....	....	1.8	1.2	2.7	....	0 4	....	1 6
Gravity, °A.P.I.	58 3	....	58 5	58.7	58.4	53 0	51.4	56 1	56 8
100 cc. A.S.T.M. Dist.:									
I.B.P. °F.	106	....	116	122	118	104	126	100	120
10%	125	....	162	156	160	164	185	151	166
50	254	....	254	244	254	272	269	259	258
90	350	....	340	332	338	372	366	355	344
E.P. °F.	394	....	386	382	384	401	398	393	389
Octane number (motor)	72	....	70	70	....	73	72	72	70
Color ° saybolt	....	....	30+	28	30+	....	30+	....	30+
Color stability*	....	....	24	24	26	....	23	....	23
Sulfur, per cent	0 63	....	0 19	0 26	0 12	0 26	0 11	....	0 17
Oxygen bomb stability induction period, min.:									
Original gasoline	....	175	260	110	230	....	315	140	210
Original gasoline + 0.025% UOP No. 1	....	240	1170	565	1340	....	1040+	195	630
Copper dish gum mgs./100 cc.:									
Original gasoline	....	71	4	5	5	....	4	39	4
Original gasoline + 0.025% UOP No. 1	....	27	2	3	3	....	4	35	2

*Equivalent to two hours noon June sunlight. †Acid at 40° F.

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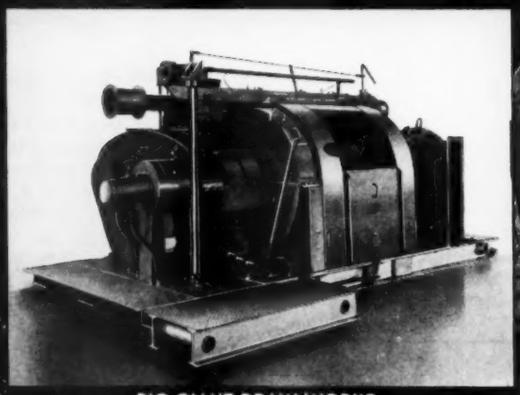

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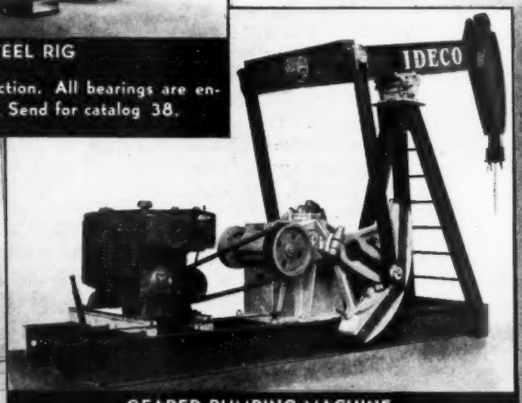

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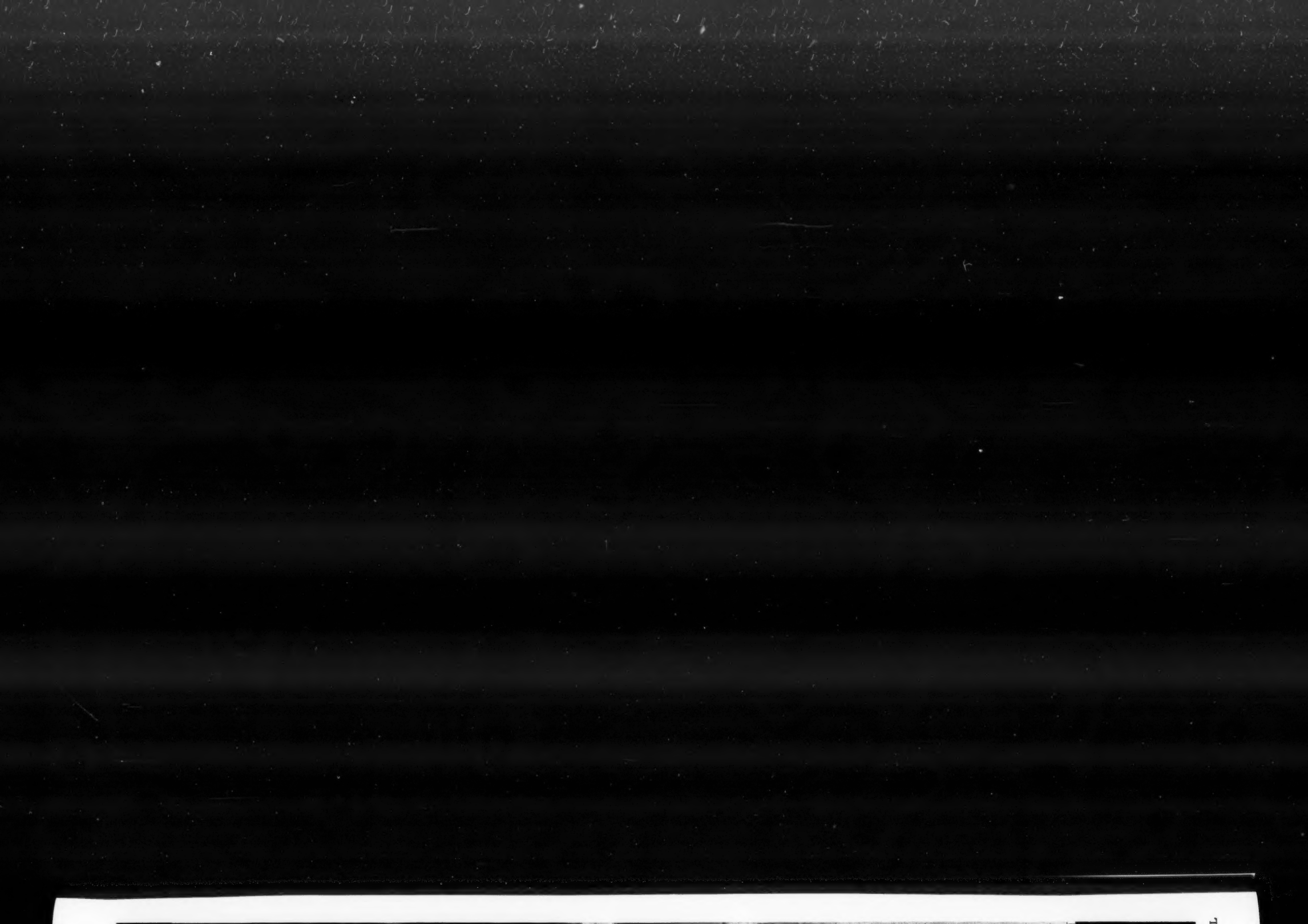

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sired endpoint is removed. For kerosenes and similar distillates, the still temperature is raised to 425-475° F. if necessary.

Endpoint

The percentage taken off is usually less than that shown by either Engler or Hempel distillation. This is due to the greater distillation loss as well as the gasoline polymerization. It is advisable for the inexperienced operator to cut about 10 per cent below the Engler percentage and continue to make 1 per cent cuts up to this percentage using them, if necessary, to blend back into the bulk cut until the desired endpoint is reached. The experienced operator who knows the character of the oil being treated seldom takes more than two cuts and rarely does it become necessary to use them. The endpoint is determined on the distillation apparatus, A.S.T.M. D86-26.

Treatment of the Finished Gasoline

The treated, distilled gasoline is agitated with 3 per cent 8° Be. caustic for five minutes in a separatory funnel to eliminate any sulfur dioxide that is formed during distillation.

Some finished gasolines are sour after rerunning. If they are to be sweetened, wash with plumbite until the product is sweet and add enough sulfur to completely break down the lead mercaptide. The amount of plumbite, the concentration, and also the amount of sulfur used depends on the sourness of the gasoline.

Solution and Polymerization Losses

A. *Solution loss:*

1. Measure the oil charged and correct its volume to 60° F.

2. Measure the oil recovered and correct its volume to 60° F.

3. Add the amount of oil on sludge after settling over night to the recovered oil.

$$\text{Solution loss \%} = \frac{\text{Oil charged—oil recovered}}{\text{Oil charged}}$$

B. *Total loss:*

1. A 100 cc. Hempel distillation is made on the untreated oil, using a 200 cc. round bottom flask and a 4-6 inch Hempel column filled with glass beads, remainder of apparatus and procedure similar to A.S.T.M. D86-30 with the following exceptions. The distillation is continued to a predetermined cut temperature.* The distillation is stopped at this cut temperature, the bottoms remaining in the flask are cooled and measured, and the loss on distillation added to the per cent overhead at the cut temperature. Viz. charge 100 cc.

*Predetermined cut temperature. This depends on the kind of oil being treated.

Cut temp. 350° F.:	
Per cent over	90.0
Per cent bottoms	8.7
Per cent loss	1.3

The actual per cent over at 350° F. = 90.0 + 1.3 = 91.3 per cent. The latter figure is used in the calculation.

(a.) Endpoint distillates. A 100 cc. Hempel distillation is run to 92 per cent over and cut temperature recorded. Treated distillate is run to the same cut temperature and per cent over noted.

(b.) Pressure distillates where a definite endpoint distillate is removed. A 100 cc. Hempel distillation on both the untreated and treated distillate is run to a cut temperature the same as the endpoint being made. If 400° F. endpoint distillate is to be removed from a 475° F. endpoint pressure distillate, the Hempel is cut at 400° F.

2. The distillation is repeated using the treated oil and cutting at same temperature as in 1.

Total loss = per cent untreated — (100-solution loss) × (per cent in the treated).

C. *Polymerization loss:*

Polymerization loss = total loss—solution loss.

Vapor Phase Clay Treatment of Gasoline

The method described herein is one of the early laboratory procedures recommended by the Gray Process Corp. This laboratory procedure is designed for determining the applicability of the vapor phase clay treatment to gasolines, pressure distillates, and naphthas. It allows an estimation of the yield obtainable from a given clay and the quality of the product.

The apparatus to be used consists of a constant-feed charger, a flash pot of 500 cc. capacity through which the distillate to be treated is flashed and which is connected to the tower proper by a ground joint.

One hundred grams of glass beads are placed in the flash pot. A wad of glass wool is placed at the bottom of the fractionating tower (see sketch) to prevent clay from entering through the vapor holes. Two hundred grams of 60-100 mesh Attapulgus or reference clay is charged through the small opening in the top of the second chamber. The central tube above the glass wool is filled with glass beads. The top of the chamber is connected to the condenser. The outside of the tower is insulated so that the heat loss is kept at a minimum. The charger is connected to the flash pot and the rate of gasoline adjusted so that it enters the flash pot at 350 cc. per hour. The flash pot is heated to a temperature of 425-500° F. and the gasoline passed into it. The polymers are withdrawn from the polymer outlet which originates at the bottom of the fractionating column. Three hundred fifty cc. (10 bbl./ton) cuts of the overhead distillate are made and each cut neutralized with 2 per cent caustic solution. The tower is operated until the color of the overhead distillate reaches 15° Saybolt. Portions of each 10 bbl. cut are blended for 0-100 bbl. 0-200 bbl. etc. (These blends are tested for doctor, color-stability, gums, induction period, sulfur, and octane number).

(Continued on Page 109)

TABLE 2—MOTOR FUELS OBTAINED FROM VENEZUELAN CRUDES

Cracking stock	Venezuelan Colon residue			Venezuelan Colon str. run			Venezuelan topped crude (Cumarebo)		
Properties of cracking stock—									
°A.P.I. gr., at 60° F.	19.4			58.8			35.4		
Total sulfur, per cent	1.46			0.03			0.15		
Octane number	....			46			....		
Treatment of cracked gasoline—	None	Doctor	Acid	None	Doctor	Acid	None	Doctor	Acid
Acid, lbs./bbl.	....	....	2	....	....	1	....	....	2
Acid solution loss, per cent	....	....	0.6	....	....	0.5	....	....	1.0
Polymerization loss, per cent	....	....	0.3	....	....	0.2	....	....	0.5
Gravity, °A.P.I.	61.2	....	62.2	60.9	....	59.9	61.0	....	58.4
100 cc. A.S.T.M. Dist.:									
I.B.P. °F.	108	..	110	95	....	102	100	....	114
10%	148	....	145	136	....	143	148	....	156
50	238	....	233	249	....	244	264	....	262
90	334	....	320	336	....	344	376	....	370
E.P. °F.	382	....	370	390	....	380	296	....	394
Octane number (motor)	69	..	68	68	....	68	61	....	59
Octane number (research)									
Color ° saybolt	19	20	29	13	13	25	6	6	24
Color stability*	....	....	24	....	....	21	....	....	21
Sulfur, per cent	0.13	0.13	0.09	0.03	0.03	0.03	0.03	0.03	0.03
Oxygen bomb stability induction period, min.:									
Original gasoline	....	55	100	....	265	275	....	330	420
Original gasoline + 0.025% UOP No. 1	....	155	570	....	490	1,000	....	440	850
Copper dish gum mgs./100 cc.:									
Original gasoline	....	107	3	....	12	2	....	123	9
Original gasoline + 0.025% UOP No. 1	....	45	3	....	2	1	....	16	8

*Equivalent to two hours noon June sunlight.

TABLE 3—MOTOR FUELS OBTAINED FROM RUMANIAN CRUDES

Cracking stock:	Rumanian white spirits and heavy naphtha		Rumanian kerosene		Rumanian gas oil		Rumanian fuel oil		Rumanian crude oil			Rumanian pressure dist. Botts		Rumanian wax distillate			
Properties of cracking stock—																	
°A.P.I. gr. at 60° F.	49.6		44.2		36.4		23.4		35.7			37.9		26.8			
Per cent total sulfur	0.01		0.03		0.10		0.33		0.16			0.09		0.21			
Treatment of cracked gasoline:	Doctor	Vapor phase clay	Doctor	Vapor phase clay	Doctor	Vapor phase clay	Doctor	Acid	Doctor	Acid	UOP	Doctor	Vapor phase clay	None	Doctor	Acid	Vapor phase clay
Acid, lbs./bbl.	....	....	....	....	....	....	....	4	....	2	....	....	....	....	....	2	....
Acid solution loss, per cent	....	....	....	....	....	....	....	1.4	....	1.3	....	....	....	....	....	1.2	....
Polymerization loss, per cent	....	2.5	....	2.3	....	2.5	....	1.1	....	0.6	....	....	2.6	....	....	1.6	2.4
Gravity, °A.P.I.	54.4	53.2	62.8	61.9	60.9	59.4	59.5	59.9	60.5	59.3	60.0	54.4	53.2	63.5	....	64.3	64.3
100 cc. A.S.T.M. dist.:																	
I.B.P., °F.	92	124	96	106	99	111	94	106	96	108	108	104	110	98	....	94	106
10 per cent	162	186	130	140	133	150	144	148	147	154	152	136	149	132	....	132	138
50	283	282	234	231	235	240	272	252	259	256	250	235	238	222	....	214	216
90	334	330	318	313	333	324	378	372	370	366	368	328	328	310	....	290	287
E.P., °F.	372	362	360	357	368	364	398	394	389	387	388	365	361	335	....	328	332
Octane number (motor)	70	71	70	71	72	72	69	68	68	67	67	72	73	71	....	70	71
Octane number (research):																	
Color °Saybolt	6	30	13	30	5	30	....	27	....	23	30	16	30	....	....	30	30
Color stability*	....	28	....	29	....	26	....	19	....	20	30	....	27	....	....	27	25
Per cent sulfur	0.02	0.02	0.03	0.03	0.04	0.04	0.08	0.06	0.09	0.06	0.05	0.05	0.05	0.05	0.05	0.03	0.04
Oxygen bomb stability induction period, min.:																	
Original gasoline	75	150	95	105	35	250	....	....	....	....	....	110	180	....	160	110	75
Original gasoline + 0.025 per cent UOP No. 1	360	1,965	165	1,525	135	1,175	....	....	....	....	....	235	1,110	....	360	830	235
Copper dish gum, mgs./100 cc.:																	
Original gasoline	38	6	25	4	232	4	294	12	74	61	42	105	2	....	27	2	29
Original gasoline + 0.025 per cent UOP No. 1	3	3	3	2	6	1	16	2	18	7	6	7	0	....	1	1	7

*Equivalent to two hours noon June sunlight.

Three hundred fifty cc. per 200 mgs. clay = 10 bbl./ton. To convert the yields to a commercial scale basis, multiply by at least a factor of 10. The plant loss equals the difference between the charge and the summation of the overhead distillate and the polymers. The polymer loss equals the amount of polymers minus the amount of gasoline contained in the polymers. The apparatus is so designed to give a treated gasoline of about the same endpoint as the charged gasoline.

Foreign Countries from Which Crudes Were Obtained

The following list of countries are those from which the cracked gasolines were derived: Russia, Venezuela, Rumania, Iran, Sumatra, Mexico, Iraq, Argentina, Canada, Bahrein Island, Dutch East Indies, Greece and Sakhalin Island.

The cracked gasolines were all obtained from a variety of cracking stocks ranging from naphthas kerosenes, gas oils, wax distillates, pressure distillate bottoms, topped crudes to fuel oils. These stocks were cracked in a Dubbs pilot cracking unit using single and two coil operations. The temperature ranges used were between 925 and 1,000° F., and pressures from 200 to 500 pounds per square inch, depending upon the charging stock.

Russia

The second largest oil producing country in the world is the U.S.S.R. Its production during 1935 was 176,688,000 bbls. of crude oil. Grozny, Baku, and the Ural Mountains are the three great oil producing areas. The quality of the crude oil ranges from 30-35.6 A.P.I. gravity with gasoline contents ranging from 22-29 per cent. The sulfur content of the gasoline ranges from 0.1 per cent in a Grozny crude to 2.8 per cent in that derived from the Ural Mountain crude.

The Russian daily capacity of crude oil in their ten refineries was 507,300 bbls. while the cracking capacity is 65,500 bbls.

The cracked motor fuel produced from gas oil, naphthas, and mixtures thereof from Ural Mountain crude oil was refined with split plumbite and sulfuric acid, the results of which are shown in Table 1.

Venezuela

The third largest oil producing country in the world is Venezuela, having eighteen oil producing fields. The quality of the crude oil ranges from 16-35 A.P.I. with gasoline percentages of from 9-47 per cent. The daily refining capacity of crude oil of six refineries in Venezuela is 25,000 bbls. with no cracking instaflations. The bulk of the crude oil production of Venezuela is refined in other countries.

The results of refining Colon residue, Cumarebo topped crude, and Colon straightrun gasoline are shown in Table 2.

TABLE 4—MOTOR FUELS OBTAINED FROM IRANIAN CRUDES

	Cracking stock—Iran heavy naphtha		Iran topped crude	
Properties of cracking stock—				
°A.P.I. gr., at 60° F.	51.1		26 4	
Per cent total sufur	0 14		1 46	
Octane number	38		....	
Treatment of cracked gaso.	Doctor	Acid	Doctor	Acid
Acid, lbs./bbl.	1	....	2	6
Acid solution loss, per cent	0 4	....	1 1	2 6
Polymerization loss, per cent	0 0	....	0 5	1 4
Gravity, °A.P.I.	50 8	49 2	60 9	61 5	62 3
100 cc. A.S.T.M. dist.:				
I.B.P. °F.	88	118	95	116	115
10 per cent	167	170	132	148	149
50	289	280	234	237	234
90	366	361	336	332	331
E.P. °F.	397	393	388	379	372
Octane number (motor)	75	75	71	70	69
Color °Saybolt	17	30	17	27	30+
Color stability*		26		20	27
Per cent sulfur	0 05	0 05	0 13	0 09	0 08
Oxygen bomb stability induction period, min.:					
Original gasoline	180	125	150	55	70
Original gasoline + 0.025 per cent UOP No. 1	365	620	245	410	500
Copper dish gum Mgs./100 cc.:					
Original gasoline	10	3	31	5	3
Original gasoline + 0.025 per cent UOP No. 1	3	2	4	3	2

*Equivalent to two hours noon June sunlight.

TABLE 5—MOTOR FUELS OBTAINED FROM SUMATRA CRUDES

	Cracking Stock Sumatra waxy residue (Pladjoe)	
Properties of cracking stock—		
°A.P.I. gr., at 60° F.	30 4	
% total sulfur	0 13	
Treatment of cracked gasoline	Doctor	Acid
Acid lbs./bbls.	....	2
Acid solution loss, per cent	....	
Polymerization loss, per cent		0 9
Gravity °A.P.I.	63 7	64 1
100 cc. A.S.T.M. dist. I.B.P. °F.	98	110
10 per cent	136	144
50	222	218
90	318	307
E.P. °F.	376	367
Octane number (motor)	69	68
Color °Saybolt	13	30+
Color stability*		25
% sulfur	0 02	0 01
Oxygen bomb stability induction period, min.:		
Original gasoline	190	155
Original gasoline + 0.025% UOP No. 1	300	640
Copper dish gum./100 cc.:		
Original gasoline	27	2
Original gasoline + 0.025% UOP No. 1	18	1

*Equivalent to two hours noon June sunlight.

Rumania

There are five crude-producing areas in Rumania, Prahova, Dambovitza Buzau, Bacau and Neamtz. The first two are the major ones, since they contain the Gura Ocnitzei and the Moreni fields. There were 66,100,000 bbls. of crude oil produced in Rumania during 1936. There are 30 refineries operating having a total daily capacity of 239,500 bbls., and a cracking capacity of 35,850 bbls. The Gura Ocnitzei and Moreni crudes have A.P.I. gravities of 37.2 and 36.0 respectively. The Gura Ocnitzei produces 29.5 per cent of 392° F. endpoint gasoline, and the Moreni crude yields 28 per cent gasoline of the same endpoint. The sulfur content is 0.16 per cent and 0.14 per cent for the Gura Ocnitzei and Moreni crudes.

A variety of Rumanian oils such as naphtha, kerosene, gas oil, wax distillate, fuel oil, pressure distillate bottoms, and crude oil were converted into cracked motor fuel.

The results of refining the gasoline by various methods of vapor phase clay treatment, acid refining, and doctor sweetening are shown in Table 3.

Iran

There are two large oil-producing fields in Iran called Masjiki-i-Sulaiman and Haft Kel. The crude oils average about 35 per cent of 400 E.P. motor fuel with an octane rating of 54. There are two refineries in Iran, one of 3,000 barrels and the other 165,000 barrels crude capacity daily (1935)—the larger plant having a cracking capacity of 65,500 bbls.

Pilot plant cracking tests were made on Iran heavy naphtha and topped crude which were refined by doctor treating and sulfuric acid. The results of the treating are shown in Table 4.

Sumatra

The crude from the southern section contains up to 60 per cent gasoline and from 30 to 40 per cent kerosene. The Palembang oil has an A.P.I. gravity of 37.8 and contains about 36 per cent gasoline, the latter containing from 5.4 to 6.5 per cent of aromatics. This oil contains from 10 to 15 per cent wax. The three refineries in Sumatra have a capacity of 72,000 bbls. of crude per day and a cracking capacity of 18,000 bbls. daily.

Sumatra Pladjoe waxy residue was subjected to cracking conditions and the motor fuel derived therefrom was sulfuric acid treated with the results shown in Table 5.

Mexico

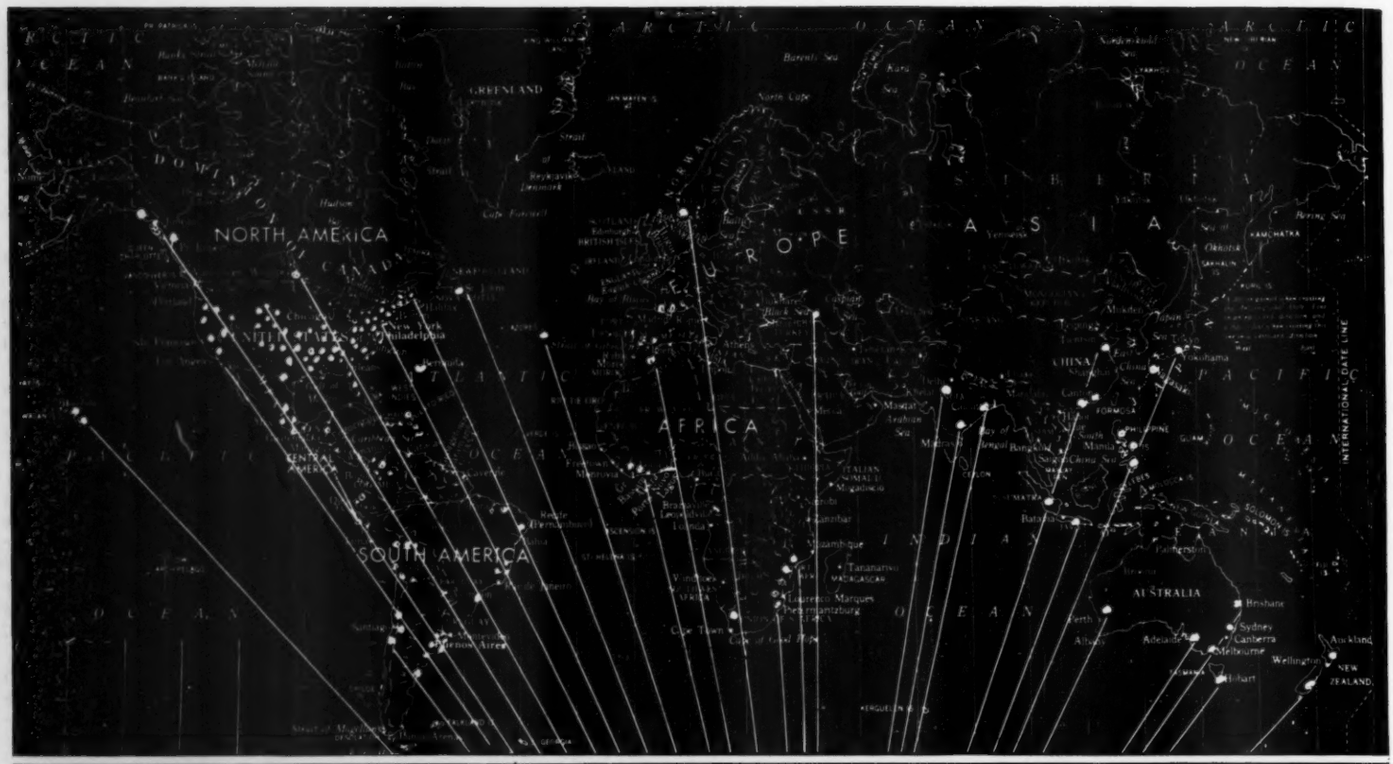
The oil production of Mexico during the year 1936 was 40,300,000 bbls. The gasoline content of 15 crude oil samples analyzed showed an A.P.I. gravity ranging from 11.6 to 43.5 and motor fuel percentages of from 6.8 to 36.5 per cent. The six refineries in Mexico have a combined daily capacity of 106,300 bbls. and cracking of 17,000 bbls.

A number of oils such as straightrun gasoline, gas oil, kerosene, white spirit, pressed oil, and reduced crudes from the Poza Rica, Naranjos and Tonala crudes were cracked into motor fuel, the refining results of which are shown in Table 6.

TABLE 6—MOTOR FUELS OBTAINED FROM MEXICAN CRUDES

Cracking stock:	Mexican st. run gaso. (Poza Rica)		Mexican heavy gas oil (Poza Rica)		Mexican pressed oil (Poza Rica)		Mexican reduced crude (Poza Rica)		Mexican kerosene (Naranjos)		Mexican kerosene (Naranjos)		Mexican pressed oil (Naranjos)		Mexican white spirit (Tonala)	
Properties of cracking stock—																
A.P.I. gr., at 60 °F.		59.9		34.8		27.0		15.3		45.6		40.9		26.2		49 9
% Total sulfur		0.15		1.22		1.98		2.81		0.50		0.85		2.12		0.12
Octane number		37		....		....		....		....		....		....		....
Treatment of cracked gasoline	Doctor	Acid	Doctor	Acid	Doctor	Split plumbite acid	Doctor	Split plumbite acid	Doctor	Acid	Doctor	Acid	Doctor	Split plumbite acid	Doctor	Acid
Acid, lbs./bbl.		1		2		6		6		8		8		10		1
Acid solution, loss, per cent		0.5		0.8		2.1		1.7		2.8		3.2		2.7		0 6
Polymerization loss, per cent		0.0		0.0		1.0		1.0		1.4		1.3		1.9		0 0
Gravity, °A.P.I.	58.5	58.2	61.2	61.1	62.2	60.8	61.1	60.5	57.1	55.5	59.6	59.2	60.0	59 6	50.0	48 9
100 cc. A.S.T.M. dist.																
I.B.P. °F.	106	108	101	106	86	102	112	115	81	105	96	102	90	107	92	132
10%	150	151	144	140	133	144	148	155	140	160	135	143	132	136	166	187
50	246	242	234	231	240	238	252	246	315	313	275	269	252	252	319	314
90	375	365	340	340	362	358	354	344	373	369	389	382	370	366	376	369
E.P. °F.	405	400	400	394	396	392	396	392	395	391	399	400	396	392	410	400
Octane number (motor)																
Octane number (research)	71	70	70	69	72	70	69	68	66	63	71	68	77	74	74	73
Color °Saybolt	17	30	15	30+	9	27	16	29	....	26	....	29	....	27	....	30
Color stability*	....	25	....	26	....	24	....	25	....	19	....	24	....	17	....	29
% Sulfur	0.07	0.05	0.13	0.07	0.22	0.10	0 25	0 15	0 26	0 12	0.27	0 13	0 34	0 15	0.07	0.07
Oxygen bomb stability Induction period, min.																
Original gasoline	90	85	60	110	225	105	120	160	....	....	....	....	....	45	80	135
Orig. gasoline+0.025% UOP No. 1	280	990	140	605	270	570	180	790	....	....	....	....	....	320	315	755
Copper dish gum Mgs./100 cc.:																
Original gasoline	18	2	8	2	15	17	19	8	145	10	337	14	129	31	7	9
Orig. gasoline+0.025% UOP No. 1	11	1	5	2	9	5	8	8	30	2	17	2	21	7	3	4

*Equivalent to two hours noon June sunlight.



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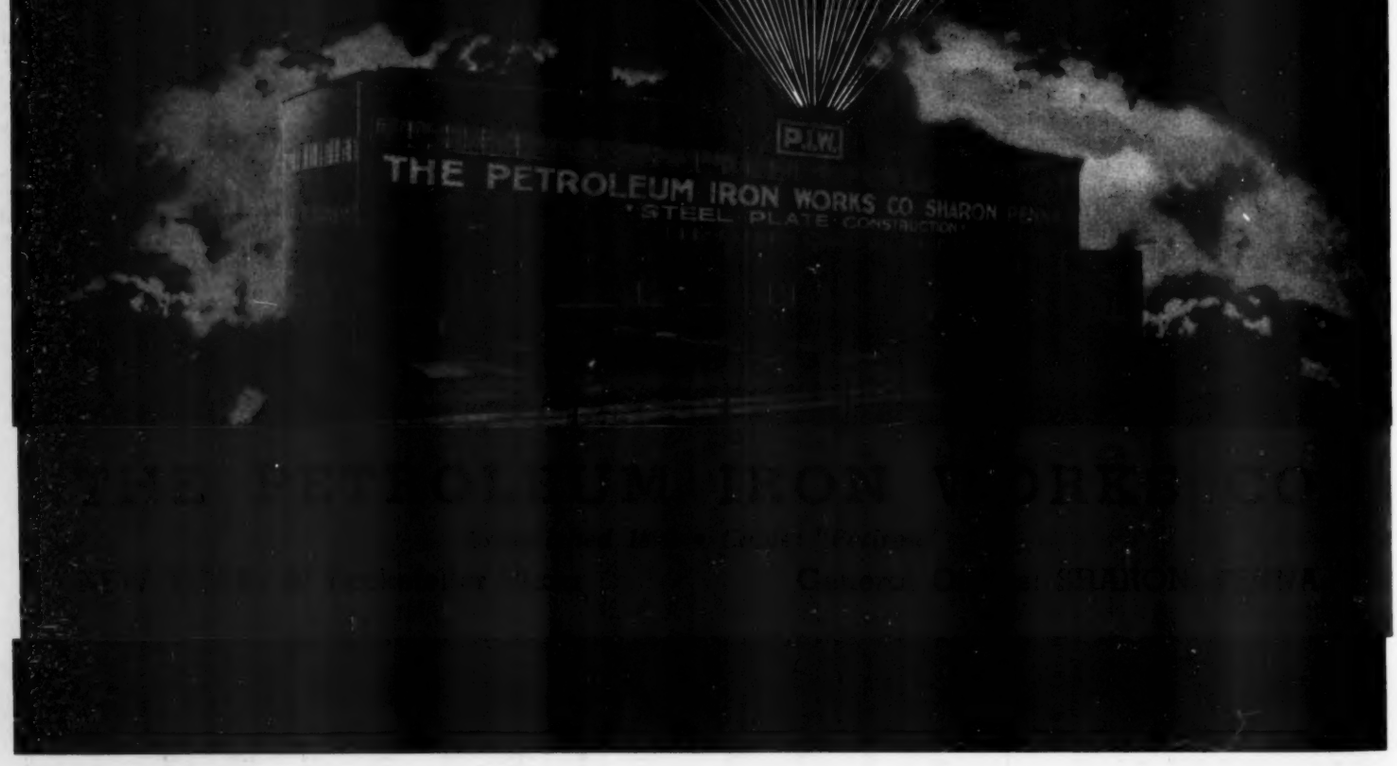

Use of Screened Liners in the Lagunillas Field, Venezuela

By H. H. PLUMMER
Mene Grande Oil Co.

In attempting to prevent sand incursion into the well bore during the period of development of the Lagunillas field, the southernmost subdivision of the Venezuelan Bolivar Coastal fields, recourse was first had to 6⅝-inch-⅛-inch perforated pipe. This size of opening proved to be too large, with the result that successively smaller openings were installed. The design finally tested, itself inadequate, was 6⅝-inch pipe perforated with 432 one-eighth inch holes per foot. The drilling of holes smaller than one-eighth inch was not practicable at the time, thus turning attention to screened pipe.

A consistent program of experimentation was put into operation. The first screens tested were of different makes and were the finer meshes—50 and 75. In subsequent installations the mesh number decreased and the area of the perforated and slotted openings of the pipe was increased. The final adoption, after successful operation had demonstrated its utility, was 25- and 30-mesh screen, either perforated with 180 half-inch holes per foot or slotted with 30 three-eighths inch by 3-inch openings per foot.

Geography and Geology of the Lagunillas District

The Lagunillas field, the southernmost subdivision of the Bolivar Coastal fields, is situated on the eastern shore of Lake Maracaibo in the state of Zulia, Venezuela. The area at present being exploited is approximately 11 miles in length and 10 miles in width. Production is secured chiefly from two zones: The upper or heavy oil zone, producing oil ranging in gravity from 13 degrees to 16 degrees A.P.I.; and the lower or light oil zone, producing oil with a gravity which varies between 16 degrees and 21 degrees A.P.I. The former is approximately 80 feet in thickness and consists chiefly of interbedded shales, clays, and unconsolidated sands. Indeed, the chief features of both the heavy and light oil zone strata are the plasticity of the clay and shales and the unconsolidated nature of the sands. The oil-saturated sands are frequently less than 2 inches in thickness; being broken up and interspersed with shale and clay laminations. The light oil zone, which is separated from the heavy oil zone by a definite shale break, is, as mentioned above, lithologically similar to the heavy oil zone and has the same approximate thickness. Each zone is subject to local variations in vertical extent; and, in the north central portion of the field, the heavy oil zone is not productive at all.

On the northern end the top of the heavy oil zone is encountered at approximately 2,900 feet. The structure plunges to the southward to such an extent that at the southern end the top of the same zone is encountered at approximately 4,200 feet.

Early Development

The development was started in the year 1926 in the approximate center of the field. The usual casing practice involved the setting of approximately 75 feet of 16-inch, 350 feet of 12½-inch, and a string of 8⅝-inch casing which was landed above the top of the heavy oil zone.

Early Liner Practice

The first liners installed in the Lagunillas district had an O.D. of 6⅝ inches and were perforated with five-sixteenths inch holes. (The below specifications for these liners are shown.) Upon completion of the wells, it was almost immediately found that sand incursion would not permit wide open flow, and, accordingly, it was necessary to choke the wells in order to prevent the cutting out of the liners. This condition imposed an unwanted proration; and in order to circumvent it, liners having smaller diameter perforations were installed as successive wells were drilled. Specifically, this program, in the order of its adoption, was as follows:

⅛-inch perforations, 5 rows staggered, 2-inch centers, 30 holes per foot, 2.3 square inches per foot.
⅛-inch perforations, 5 rows staggered, 4-inch centers, 15 holes per foot, 1.15 square inches per foot.
60 mesh Kobe
⅛-inch perforations, 14 rows, 1-inch centers, 168 holes per foot, 4.64 square inches per foot.
⅛-inch perforations, 10 rows, 1¼-inch centers, 96 holes per foot, 2.65 square inches per foot.
⅛-inch perforations, 12 rows, 1-inch centers, 144 holes per foot, 1.77 square inches per foot.
⅛-inch perforations, 12 rows, 1-inch centers, 168 holes per foot, 2.06 square inches per foot.
⅛-inch perforations, 28 rows staggered, ¾-inch centers, 432 holes per foot, 5.49 square inches per foot.

As will be seen above, the perforated area per lineal foot for the five-sixteenths and three-sixteenth inch perforated liners was in each case decreased from the original trial value, but in the case of the one-eighth inch perforations, the original per foot perforated area was the minimum employed. The final design of one-eighth inch perforated pipe contained 432 holes per lineal foot and was by far the most heavily perforated liner in use in the Coastal fields.

Sand Removal

The removal of considerable quantities of sand from around the perforated liners, in the early life of the field, would not have been so conducive to liner failure had it not been for the extremely plastic nature of the clays and shales. Hence, with the removal of the sand, the physical characteristics of the producing zone permitted a downward movement of the strata into the cavities formed by sand withdrawal. A further complication was the fact that the liner abrasion was effected in localized areas, and in these areas the cut out perforations were usually on one side of the pipe.

In recognition of these facts, an investigation was made into the adaptability of perforated liners to local conditions, and of the cores acting upon an abraded liner. The forces investigated were:

Investigation of Causes of Failure of Perforated Liners

1. The bending stress produced by running in a crooked hole.
2. The vertical columnar stress caused by the sealing operation.
3. The vertical columnar stress caused by the tubing load.
4. The lateral bending stress originating within the formation.

The stresses due to the weight of the pipe were excluded as being unimportant.

Conclusions

The conclusions drawn from this investigation were:

1. A deviation of 10-inch would give maximum stresses of 14,600 pounds/square in for 6⅝-inch pipe and 10,400 pounds/square inch for 4¾-inch 16-pound pipe. Since this deviation is seldom encountered, it was concluded that the stresses caused in this manner were a minor factor in most cases of liner failure.

Liner Fully Supported

2. With the use of 4,000 feet of 4-inch drill pipe in setting operations a maximum load of 33 tons upon the liner would result. The probability of such a failure resulting during setting operations was regarded as small because of the fact that, previous to production, cavities would have had no opportunity to develop, and hence the liner would be supported throughout its length.

Seal Tubing String

3. The sealing of the tubing string to the top of the liner is regarded as a possible cause of failure. The maximum load that could be imposed by a 4,000-foot string of 3-inch 8.7-pound tubing would be only 17.4 tons, half of which would be carried by the tubing slips. To this, however, must be added the pressure exerted by 4,000 feet of mud fluid in the annulus (26.74 square inches) between the 6⅝-inch liner and the 3-inch tubing. Assuming the use of 80-pound mud, a pressure of 2,160 pounds/square inch, or a total weight of 29 tons would result. The two weights added together give a sum of 40 tons. This weight would be sufficient to cause failure in an unsupported length of 18 feet of 6⅝-inch 28-pound pipe. For 4¾-inch 16-pound pipe fracture would occur when when the unsupported length was 9.6 feet. Each value was calculated by the use of Euler's formula, and with the assumption that the liner acted as a round end column. Failure from the weight of the drill pipe was discarded as unlikely, while failure from the combined tubing and fluid weights would depend entirely upon the formation of cavities of sufficient depth as to bring the unsupported length of the pipe within the dangerous range. This would require the transmittal of the forces downward through the liner to the point of cavitation, an act which would be facilitated by the cavitation incidental to sand withdrawal.

Beam Action

4. Failure due to beam action was considered to be the most important cause of liner failure, especially when acting in conjunction with vertical stresses.

Field's formula for fills as used here was em-

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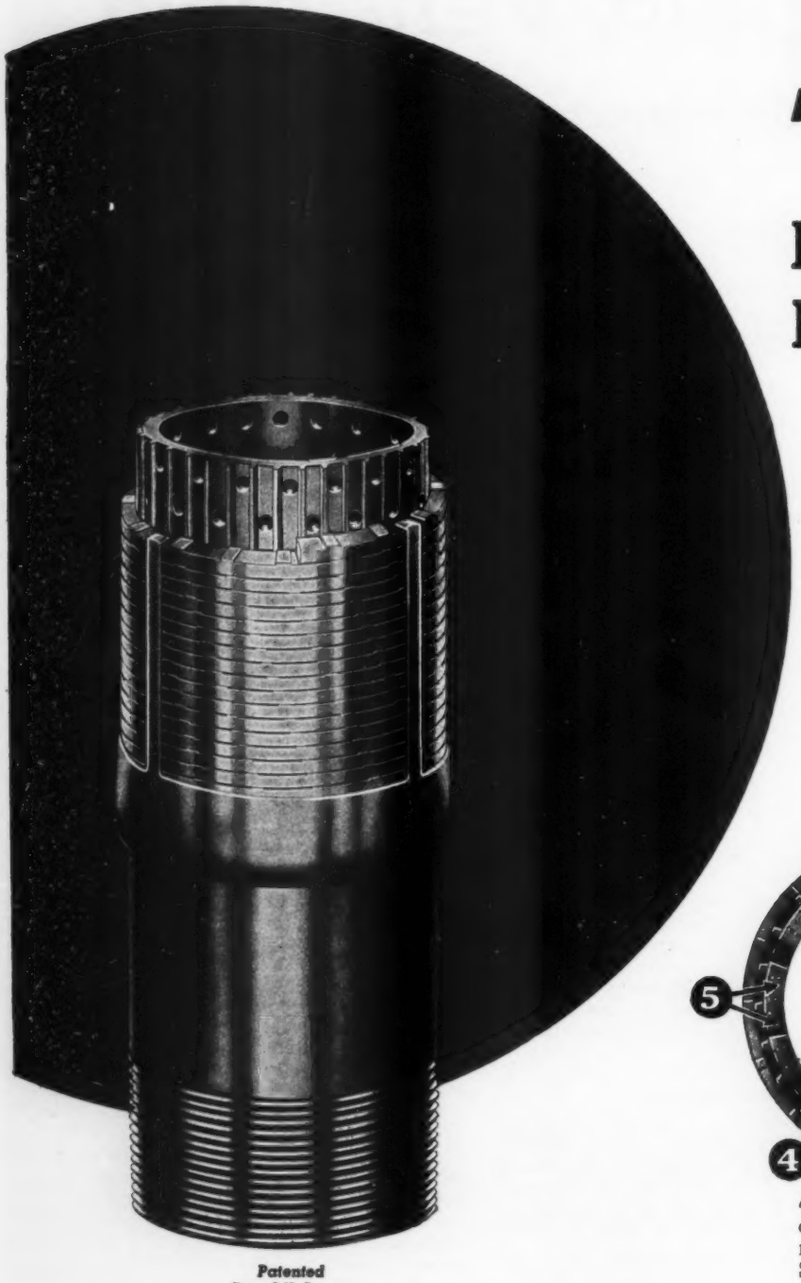
HAS PROVEN ITS WORTH



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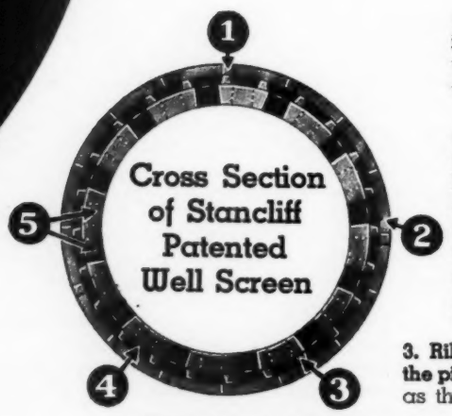
LARGE INLET AREA

ACCURACY OF GAUGE

RUGGEDNESS OF CONSTRUCTION

These features are known to a large number of producers who have used it.



1. Full depth, full width spacing lugs rolled into the square wrapping wire make the gauge and maintain it.

The lugs space the wire at the top and at the bottom of the wire. The square wire helps to resist a change in gauge from abrasion and corrosion.

2. Wire wrapping. Galvanized Steel, Brass, Bronze, Admiralty, and Stainless Steel Wire, can be furnished.

3. Ribs are laid on the outside of the pipe, and are of the same metal as the wrapping wire.

4. Flow channels are formed by the ribs to increase screening efficiency and reduce fluid velocity with the consequent minimizing of sand cutting. This construction makes the STANCLIFF SCREEN easy to clean.

5. Perforations in the pipe are staggered with one row of holes under each flow channel.

HOWARD SMITH COMPANY

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ployed for calculating the pressure when the formation piles up against the liner, which acts as a retaining wall. These pressures were:

1. 176 pounds/square foot for a loaded length of 5 feet.

2. 352 pounds/square foot for a loaded length of 10 feet.

3. 880 pounds/square foot for a loaded length of 25 feet.

4. 1,760 pounds/square foot for a loaded length of 30 feet.

Conversion of Pressures

Converting these pressures into the stresses present, the following values were obtained. For a 6⅝-inch 28-pound liner loaded for 5 feet, 10 feet, and 25 feet the maximum stresses would be 305, 2,440, and 38,127 pounds/square inch, respectively. For 4½-inch 18-pound pipe the corresponding stresses are 481, 3,852, and 60,296 pounds/square inch. Taking 45,000 pounds/square inch as the yield point, the 4½-inch 18-pound pipe would be liable to failure when loaded for 25 feet, while the 6⅝-inch 28-pound liner would still be safe for the same loaded length. Despite the fact that the calculations show that 6⅝-inch 28-pound pipe would not fail under a loaded length of 25 feet, it was found by actual experience that failure occurred in shorter lengths than this. This was attributed to dynamic forces originating within the producing zone, such as caving, shifting sand due to unbalanced pressure gradients around the well bore, etc. The pressure in pounds per square inch which must be exerted on the two sizes of liners to cause failure at various lengths between supports was then calculated, as shown below.

Casing size, inches	Weight, pounds	Length in feet of casing loaded			
		5 feet	10 feet	25 feet	50 feet
4½	16	134	33.6	5.4	1.3
6⅝	28	239	57.8	9.6	2.4

The pressures shown in the table would give a maximum stress of 60,000 pounds/square inch in the outer fibers of the pipe. This is above the yield point of Grade C A.P.I. casing and would cause failure by bending if the center of the load were near the center of the joint. In the case that the center of the load was within 25 per cent of the length of the beam from the collar, failure would occur by a collar pull-out. The strength of an ordinary screw joint is usually considered to be 75 per cent of the strength of the pipe.

In the event that the perforations on one side of the liner were cut out, a pressure differential would occur between the two sides of the liner. The pressure differentials necessary to cause failure, for a given loaded length, may be seen in the above table.

Liner Development in Rework Practice

With the cutting out of the 6⅝-inch perforated liners, a program of repair had to be devised. Two possibilities were open and each was given a test. In the southern end of the field, 4½-inch liners were inserted into the cut-out 6⅝-inch pipe. Some of them were drilled with one-eighth inch perforations, while others were drilled with holes having diameters of three-sixteenths inch and five-sixteenths inch. Screened liners were also employed, the meshes ranging from 40- to 70-mesh. The inserts were installed after mechanically perforating the 6⅝-inch liners and cleaning out to bottom. Generally, the practice was unsuccessful; the perforated liners would permit sand entry, while the screen inserts did not permit sufficient fluid entry. In the latter case, it was found that the tendency existed for shale and sand to pack between the two strings.

Screened Liner Experimentation

In the early part of 1934, the beaming of many of the wells in the Lagunillas district again focused attention on methods of controlling sand incursion. A second study was made, this time specifically involving screened liners. It was found* that when a sand sample from a given well is subjected to a screen analyses, "and the data obtained from the screening are calculated to percentages corresponding to grain size fractions and plotted on standard logarithmic paper, the section of the 'Percentage Grain Size' curve lying under 15 per cent may be regarded as including the critical screening range." In other words, " . . . somewhere in that range will be found a sand grain size that will correspond to the dividing line between sand retention and sand production," for a given size of liner opening and "for a given sand under given conditions." Experimental work resulted in the assumption "that if the screen mesh is not greater than the minimum grain size of the largest 15 per cent of a given sand, the screen will bridge readily and supply a sand filter, no matter what conditions of pressure and fluid movement obtain."

In line with the above assumption, bailer samples were secured from 38 wells. The averaged results of the screening of these samples were plotted on a curve. From this curve it will be seen that the minimum grain size of the largest 15 per cent of the sands lies between 35- and 48-mesh.

Screen Mesh

In order to secure as large an opening as possible 6⅝-inch 40-mesh screened liner having Grade C casing, perforated with 144 three-eighths inch holes per foot, was secured. Later, as successive installations of this type of screen were successfully make and used in sidetracked holes, the specifications were changed to provide for 180 three-eighths inch holes per foot in Grade D casing. The 40-mesh screen remained standard during the year 1934, but in 1935 the practice was initiated of installing 30-mesh liner opposite the heavy oil zone. The object of this change was to provide a larger screen opening for the relatively viscous oil produced from this formation. Subsequently, and including the above-mentioned meshes, the types of screened liner shown below were employed. The arrangement is in the order of trial:

	O.D. (in.)	Mesh	No. of holes or perforations per ft.	Size of holes or perforations	Area of openings per foot, sq. in.	Grade and weight of casing
(1)	6⅝	40	144	⅜	15.90	28-lb., C
(2)	6⅝	40	180	⅜	19.88	28-lb., D
(3)	6⅝	30	180	⅜	19.88	28-lb., D
(4)	6⅝	25	180	⅜	19.88	28-lb., D
(5)	6⅝	30	180	½	35.34	28-lb., D
(6)	6⅝	25	30	⅜"x3" (vertical slots)	33.75	28-lb., D

From the curve sheet it was determined that 25-mesh screen provides a larger opening than the largest grain size shown on the curve. This apparent inconsistency is explained by the fact that the largest grain sizes in the northern end exceed the average of the grain sizes in the heavy and light oil zones in the earlier developed parcels to the south. It is in these northern parcels that 25-mesh screen is being employed. The same is also true of the productive sands in the Tia Juana area 15 miles to the north of the Lagunillas field. The 30-mesh screen, however, is within the plotted range of grain sizes and is used in the area from which the sand samples were obtained. It will thus be seen that the use of a screen having an opening larger than the smallest average grain size of the largest 15 per cent of the grains has proved successful.

Effects of Secondary Screen Installations

During the period December 1, 1931, to August 31, 1934, a total of 40 4½-inch screen liners were installed in the Cabimas district, the northernmost producing areas of the Bolivar Coastal fields. Recourse was had to inserted liners for the reason that the relatively low average daily production of the wells, approximately 100 bbls. per day, would not permit the profitable installation of new 6⅝-inch liners.

*"Selection and Use of Screened Pipe," by C. S. Wilson. A.I.M.E. Transactions, Petroleum Division, 1934, p. 116.

The conclusions drawn from an investigation of this work were:

1. The installation of a new liner was economically admissable when a ratio of 3.5 crew hours per 100 bbls. of production obtained. An average service cost of $5.75 per hour was determined, using Rig Rental, Transportation, and Roustabout and Reconditioning Labor as a basis for cost calculations. Other factors were an estimated value of $0.25 per barrel for oil at the well head, and an exchange rate of Bs. 4.00 to the dollar.

2. A net saving of $0.0446 per barrel of oil produced was effected by inserting the 40 screen liners. Before the installations were made the per 100-bbl. service costs averaged $6.96, compared to $2.50 after the liners were set. This is equivalent to an average of 1.21 and 0.43 crew hours per 100 bbls. of production before and after installing the liners, respectively.

The comparison in the well puller hours per 100 bbls. of production for the Cabimas and Lagunillas districts is shown below:

Well puller hours per 100 bbls. production—	
Before workover:	
Cabimas	1.21
Lagunillas	0.78
After workover:	
Cabimas	0.43
Lagunillas	0.24
Per cent reduction:	
Cabimas	64.4
Lagunillas	68.8

As will be seen the workover jobs in the Lagunillas area were slightly more effective in reducing the repair time-production ratio.

Completion Practices

Workover wells: Liners are washed for a minimum of one hour and sealed to the 8⅝-inch casing seat. The pump, tubing and rods are then run, and the well is pumped to its maximum capacity; the latter seldom exceeds 500 bbls. per day. The formation of the sand screen over the screened openings permits the passage of the finer grains into the well bore, and consequently a clean-out job is occasionally necessary within a few weeks after the liner has been installed.

New wells: Where the reservoir pressures are sufficiently high to clean the well of mud, the wells are washed into production and allowed to flow at their maximum capacity. This practice has been followed at the completion of approximately 45 wells within the past year without a single liner cutting out. In two instances, however, it has been necessary to choke back wells equipped with 25-mesh screen in order to lower the sand cut. An investigation is now being made of this occurrence.

In partially depleted areas, the 25- and 30-mesh liners are washed and the wells swabbed into production. No liners have been cut out in 18 completions.

Subjects for Future Investigation

Several factors which have an influence on the adaptability of screened liners to any given production practice yet remain to be determined. Among these are:

1. An investigation of the influence of varying fluid conditions and pressure differentials across the liner wall on the permanence of a sand screen formed under given conditions of fluid state and pressure differential and for a given mesh of screen.

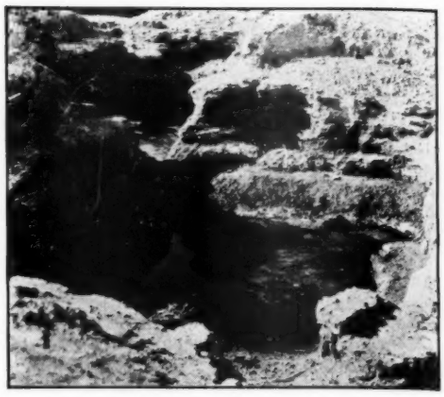
2. Laboratory tests on the elastic limit in compression of liners screened with various meshes, and having slots or holes of varying size and distributive arrangement.

3. The influence of the cross-sectional shape of the wire used in wrapping screened liners.

Finally, it must be apparent to all that there should be a rigid insistence upon the part of the purchaser that the manufacturers furnish screened pipe having a uniform opening between the wires. The harmful effects of sand incursion into a well bore are of a cumulative nature, and once a breach in the liner has been made, practically the only recourse by which the incursion may be reduced is to curtail production.

Development in Peru Aided by Proximity of Fields to Seacoast

By H. W. Palkowsky



Oil seepage near La Brea

From both a historical and a commercial standpoint Peru became the first oil producing country on the South American Continent. According to records the recovery of crude oil in northern Peru from active seepages and the utilization of the residuum, after partial evaporation in earthern jars, for lining fishing boats and other sailing craft dates back to the sixteenth century. In point of time then, it may be well surmised that here indeed was the historical origin of the producing and refining of petroleum on the western hemisphere.

The first noteworthy attempts to develop petroleum on a commercial basis on what is now known as the La Brea-Parinas estate of the International Petroleum Co., Ltd., commenced about 1870. It was not until about 20 years later however, that these early attempts were productive of even partial success. The operating company at this time and up to 1914 was the London & Pacific Petroleum Co., which sold the property at the latter date to the International Petroleum Co., Ltd.

The Peruvian oil fields lie in a narrow coastal belt on the west coast of South America, about 5 degrees south of the equator and included within the boundaries of the company's property is the most westerly point on the continent.

The major portion of the property owned by the International Petroleum Co., is bound on the west by the Pacific Ocean and extends eastward to a low range of the Andian Mountain system. Most of the area has the appearance of a low plateau and is termed locally as the "Tablazo." Near the sea, however, the terrain in places is quite rugged and badly broken. In other areas shifting sand dunes are the chief characteristic feature.

Topography and Geology

The more or less flat surface consisting of sand stones and shales forms a geologically recent deposit on nonuniformity eroded beds of Tertiary origin. Except in those parts where the surface has been dissected by old streams indications as to the character of the underlying beds are generally obscured. All the production obtained comes from a thick series of Tertiary sediments and practically all the deep tests made heretofore have been confined to that general formation. Only a few wells are known to have penetrated the Cretaceous. A major unlift of the Tertiary during geological times caused a pronounced block faulting of these formations which resulted in the segregation of a number of more or less distinct pools within the area.

The depth levels of the different producing sands vary between the extremes of 300 feet and 4,700 feet with the average running about 2,000 feet. Likewise the total thickness of the productive strata may vary from a few feet to more than 1,000 feet with an average of about 300. As a general rule the formations are found to be exceedingly lenticular both with respect to individual sand bodies and in the sand series as well. The lenticularity of the sands along with the block faulting has some bearing on development and production methods as will be explained later.

At the present time geophysical methods such as the seismograph, magnetometer and the gravity meter are being employed to aid the exploration of prospective areas.

Field Development

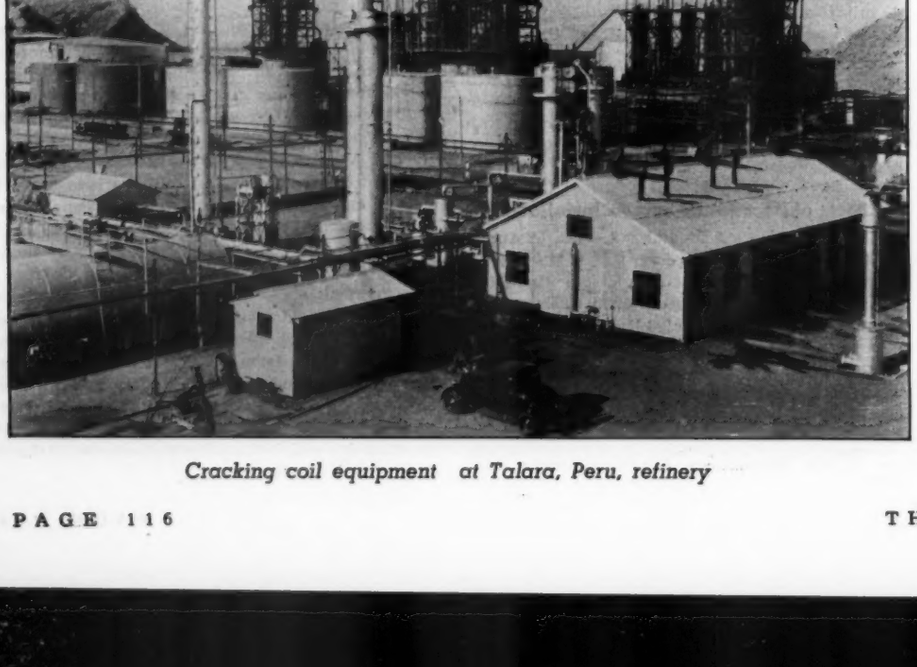
During the past 35 years nearly 3,000 wells have been drilled on this property and until 1934 when the rotary was introduced cable tools had been used almost exclusively. Cable tools had been found quite satisfactory for the greater portion of the work due to the comparatively shallow drilling and likewise on account of the uncertainty as to the depth at which productive horizons may be encountered. The latter condition is due to excessively faulted structure and to the lenticular character of some of the producing sands.

Cable tools are still being used to a considerable extent and for depths of less than 1,000 feet portable drilling machines are employed to a good advantage. Rotary tools are now being used for drilling the deeper wells and also in those areas having high gas pressure. An abundant supply of natural gas in the field is conducive to the use of steam operated rigs and, as the drilling time per well is comparatively short, portability of drilling equipment is a highly desirable feature. Due to alternating strata of hard sandstone and shale the use of both rock bits and the drag type is found necessary.

As a general rule water difficulties are not hard to overcome. In certain sections of the field bottom water is encountered to an appreciable extent, but most of the time serious trouble can be avoided by limiting penetration. Where an unusually heavy flow of water is encountered the ordinary cement plug-jack job proves reasonably effective. The upper sands above the producing zones are water-bearing and in order to protect the latter from water intrusion as well as the casing against corrosion the protective string is cemented all the way to the surface.

The usual casing practice for rotary drilled wells is to set a few hundred feet of 10-inch surface pipe cemented from bottom to top for water exclusion. Then a 6⅝-inch oil string is cemented on top of the producing zone the level of which may run between 2,000 and 4,000 feet. A 5-inch perforated liner is set opposite the producing section.

In cable tool drilled wells it is more difficult



Cracking coil equipment at Talara, Peru, refinery

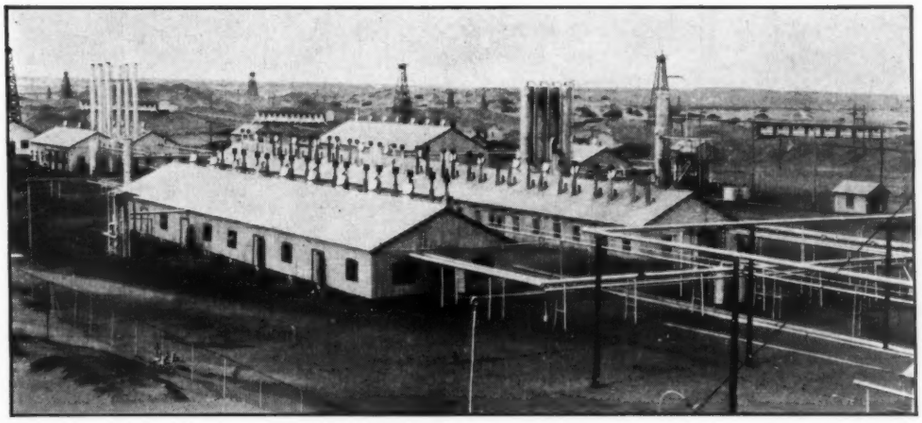
to plan a definite casing program in advance due to the greater uncertainties of cable tool drilling and also because many of these wells are semi-exploratory. Consequently the common practice after cementing two or three hundred feet of surface pipe is to "carry" a casing string to the oil sand to prevent caving. After reaching the producing zone the protective string is pulled and a permanent oil string set.

For drilling purposes 122- foot and 136-foot steel derricks are used.

Oil Production and Gas Conservation

Over 1,800 wells are now being produced on the property by three methods of lifting, natural flow, gas lift and pumping. Complete advantage has been taken during the past 10 or 12 years of all the opportunities afforded by unit operation toward maximum recovery. Gas repressuring has been carried on since 1927 with highly satisfactory results and in all producing operations every means is taken to produce oil with the least possible expenditure of gas energy. Oil production is controlled by gas-oil ratio and pressure maintenance. Back-pressure is held on practically all flowing wells and the pumping speed and stroke regulated on pumping wells. As a result the gas-oil ratio on flowing wells averages about 350 cubic feet per barrel and the general average for all classes in the entire field is less than 1,000.

At the present time about 25,000,000 feet per day, or approximately 60 per cent of the total gas production, is being returned to the producing sands. Pressure maintenance has been carried on in two of the pools, Mile 6 and Section 16, since 1933 and a volume representing over 100 per cent of the gas produced has been returned to these areas. Separation of these pools from each other and from adjacent producing areas by block faulting is one of the features which lends itself to a policy of pressure maintenance. All the gas returned to the producing zone has been injected through input wells at the crest of the structure with the idea of replacing with gas the fluid content withdrawn from the reservoir during the course of production. In order to accomplish this with a minimum waste of energy, it has been necessary to carefully observe and control the performance of individual wells particularly as the expanding gas cap approaches producing wells. The fact that the gas-oil ratio under appreciable withdrawals over the past three years has been maintained around 330 cubic feet per barrel bears ample testimony to the degree of efficiency attained in this respect. It is estimated that the above figure approximates the quantity of gas held in solution by the oil under current reservoir conditions. The oil at the surface has an A.P.I. gravity of 40 degrees and it is estimated that the gravity of the reservoir oil with gas in solution is around 57 degrees A.P.I. There appears to be no doubt but that the maintenance of high pressure has been an aid in holding practically all the gas in solution and the resulting fluidity of the oil should prove effective in increasing the rate of recovery as well as ultimate recovery. Furthermore practically all the oil recovered to date has been obtained by natural flow and the indications are that pumping may not be necessary in these areas.



Lomitos gasoline plant

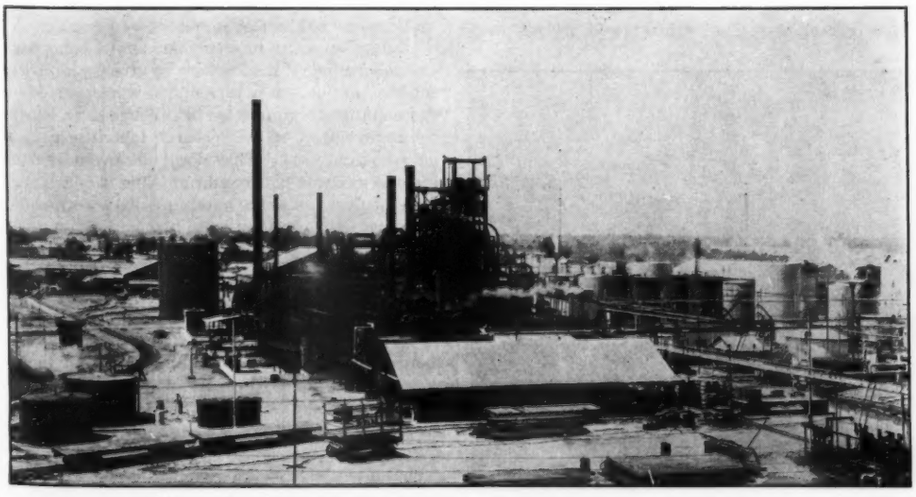
Four Stages of Lifting

Many wells in the field pass through four stages of lifting during their productive life. When natural flow ceases and while the production is too large to be handled conveniently by pumping gas lift is used. Following that an individual pumping unit is installed until such time as the production reaches the range of central power pumping. The "catalinas" or central pumping powers are the geared wheel eccentric type using a gas engine as prime mover. The number of wells connected to one power unit naturally depends upon such factors as the size and depth of the wells, the terrain, and the well density. The number may vary from less than 10 up to as high as 38. The usual speed of operating the pumping powers is at 16 strokes per minute although where small wells are being produced the speed is reduced to that of slow motion to keep down maintenance costs. Careful engineering attention is given to the design of jerk lines and whenever possible these are installed with a sag in the line. This factor is especially important in reducing friction in long jerk lines—some of which are as much as 2,000 feet in length.

Every practical means of precaution against evaporation loss is taken during the various stages of producing and handling of the oil. Only gas tight tanks are used in the field for receiving the oil after passing through gas separators and each battery of tanks is equipped with an overhead gas equalizer so that a minimum amount of air will gain access during the interval of pumping out a tank.

All gas produced with crude oil is treated for natural gasoline extraction. There are six plants of the absorption type operating within the field. Three of these are equipped with both distillation and absorption units while the other three are chiefly compressor stations with absorbers to which the mineral seal oil is pumped from the main plants.

The gas is pulled in at 14 inches of vacuum and discharged through the absorbers at pressures ranging from 45 to 300 pounds per square inch. There is an aggregate compressor capacity including both vacuum and high pressure units of 18,000 horsepower. The crude gasoline product as manufactured at the several plants is all pumped to a central stabilizing plant for conditioning. The consolidation of various processes such as distillation and stabilization is found to have distinct advantages from standpoints of economy and efficiency of operation. A butane bottling plant is also operated in conjunction with the stabilizer. The finished natural gasoline is pumped to the refinery at Talara where it is received and stored under 15 pounds pressure in radial-cone tanks of 55,000-bbl. capacity.



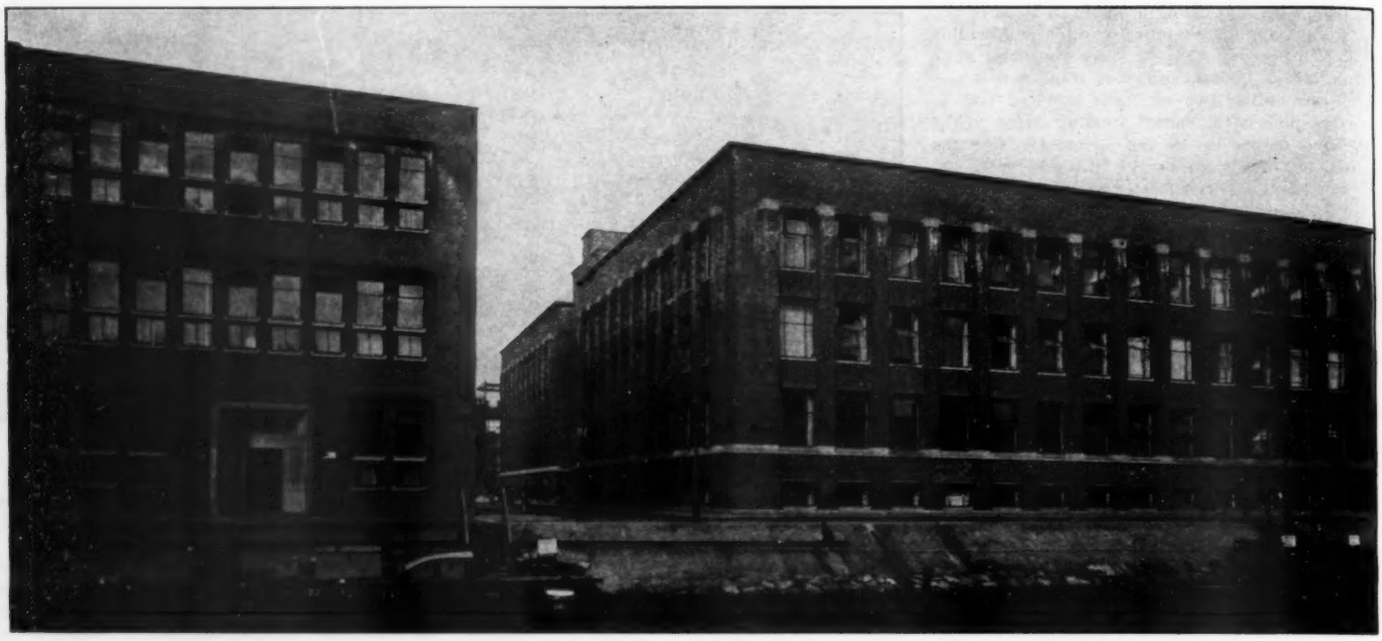
Refinery at Barranca-Bermeja, Peru

Refining and Shipping

The refining and shipping facilities of the International Petroleum Co., Ltd., are situated at the port of Talara which has one of the best equipped harbors on the west coast of South America.

The refinery has a daily throughput of 16-17,000 bbls. of crude and manufacturers gasoline, kerosene, diesel oils, several grades of lubricating oil and asphalt. Both high and low cold test crudes are processed although the latter is used exclusively for lube oil manufacture.

A standard tube and tank cracking plant has been in operation at the refinery since 1926. This unit operates on reduced crude which is cracked to yield light distillate, diesel oils and bunker fuel oil. The high- and low-pressure gas produced in cracking operations together with the uncondensed vapors from the crude stills are gathered and processed in a gasoline absorption plant. The light fractions recovered from this plant are used for blending purposes along with the product received from the field.



New and old buildings as parts of Royal Dutch-Shell's laboratory at Amsterdam, Holland

Shell Oil Has Large Research Laboratory at Amsterdam

If we consider the role played by laboratories in the history of the petroleum industry since 1860, we at once see that this part was a very modest one during the first 40 years. In this period most refineries were managed by experts that had acquired their knowledge by practice, and in those few cases where there was a simple laboratory for routine analysis, there was no question of real research work. The only research work worth mentioning was carried out at the universities, and very often on quite independent lines keeping no touch with practical experience.

Laboratories began to play a part, however, at the beginning of the new century, chiefly owing to the fact that the industry began to employ trained chemists. Since then laboratories have been acknowledged as independent and useful institutions, whose duties came to be more and more distinct from refinery routine work. The work assigned to the laboratories gradually became so extensive, however, and so diverse, that three different types of laboratories developed in the larger oil concerns, though they sometimes remained undifferentiated in the case of smaller companies.

Firstly, there is the *works laboratory*, which is closely related to the refinery and tackles more especially all routine analyses and other problems that might improve the efficient running of the refinery. Secondly, one can distinguish the *marketing company laboratories*, who not only do control analysis work, but also often have to solve small research problems in connection with sales, correct or new applications of the products and other service of the customers.

Finally, there are a large number of research problems of general scope and of a more intricate scientific nature that are dealt with in the large *research laboratories*. The subject of these notes, the Amsterdam laboratory, is one of the reseach laboratories of the Royal Dutch-Shell group.

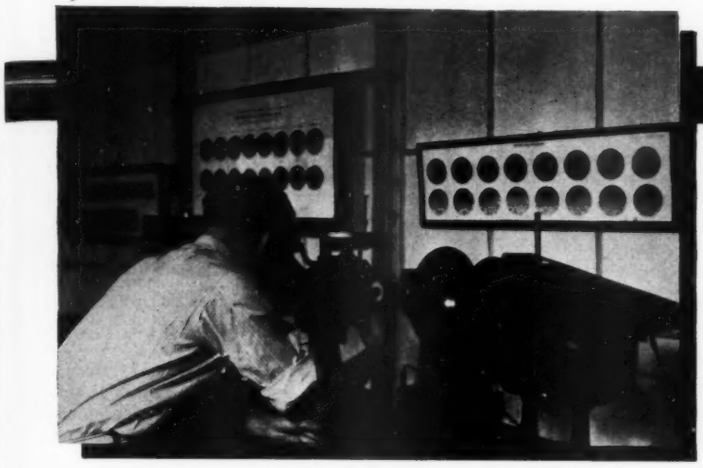
Before entering into further details concerning this laboratory, it is necessary to give some further information on the nature of the work carried out there and the organization of this work. Of course, the main object of the research laboratories is to do research work. This does not mean that no routine analysis is carried out; this is continually done with a view to obtaining data concerning base materials, products and also concerning competitors' products.

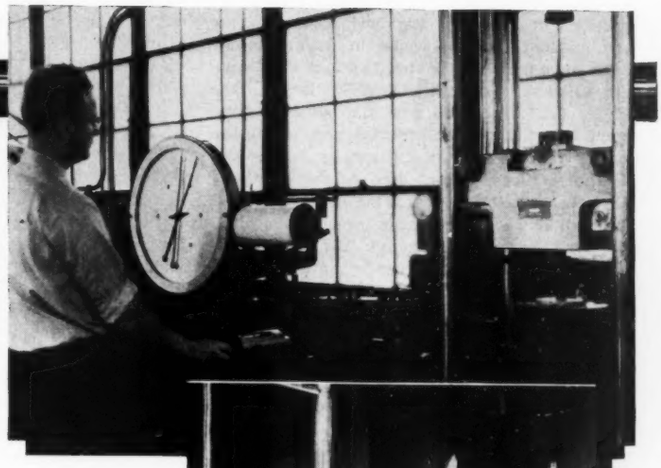
In Amsterdam much attention is, moreover, devoted to standardization work with reference to tests and apparatus. It is of course of the greatest importance in large organizations, so common in modern oil industry, that there is unity in the methods used for testing crudes and products. The methods used by all the Royal Dutch-Shell group are printed and distributed by Amsterdam, after the text has been laid down by a committee that consults the experts. Whenever possible, the official tests of the A.S.T.M., I.P.T. and other offici...

(Continued on Page 122)

Typical laboratory for study of research problems in the Amsterdam, Holland, plant

for Refinery Services





Specialized Study of Refinery Needs

Since 1932, The Babcock & Wilcox Tube Company has introduced new and important alloys for refinery service such as: Croloy 2, Croloy 3M, Croloy 9, Croloy 16-13-3. This is one measure of the Company's specialized study of refinery needs and of its ability to meet and anticipate these needs.

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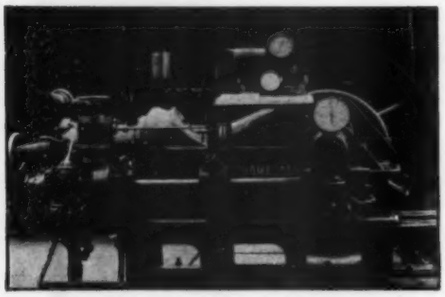
Houston, Texas . . . . . Electric Building	Oakland, Cal. . . . . 59th & Doyle Sts.	San Francisco, Cal. . . . 20th & Indiana Sts.
Los Angeles, Cal. . . . 2300 E. 55th Street	Philadelphia, Pa. . . . . Packard Building	Seattle, Wash. . . . . 32 W. Connecticut St.
New York, N. Y. . . . . 85 Liberty Street	St. Louis, Mo. . . . . 315 No. 7th Street	Tulsa, Okla. . . . . Philtower Building

standardization bodies are adopted. For it is in the interests of the petroleum industry not to make the tests for petroleum products too numerous, but rather to try and generally introduce existing tests, bringing them up to date if necessary.

Besides drawing up standard tests, it is of course necessary to prescribe in detail the apparatus to be used. These specifications are drawn up in collaboration with official bodies like the A.S.T.M., I.P.T., etc., and with the manufacturers of such apparatus; when ordering and testing the laboratory apparatus they are used by Amsterdam and other centers appointed to do this work by the Royal Dutch-Shell. By this means it is ensured that methods and apparatus are standardized throughout the group. Although this standardization builds on the results of fundamental research, it is of great importance to routine analysis, which in its turn provides the figures for the research work.

In Amsterdam a great deal of service research work is, moreover, done of a more complicated kind than routine analyses. An example of this



Diesel engine on which first cetene figures were determined

type of work is solving the problem whether it is possible to prepare the standard lubricating oils from certain crudes efficiently and economically; finding the right method of distillation or blowing (or combinations of the two) of an asphaltic residue to a specified asphaltic bitumen is another instance of such work.

Applied Research

The main portion of the work done in Amsterdam, however, is concerned with *applied research*. This comprises improving refining methods and finding new methods; the study of petroleum products and their application, and hence, on the one hand, adapting the product to the application, and on the other hand, finding new uses for certain products. It is also the aim of the laboratory to prepare entirely new products, and to find the most efficient and economical way of manufacturing them. These investigations on the subject of Pioneering Applied Research are supplemented and stimulated by *fundamental research* on the composition and structure of crude oils and petroleum products and the nature of the physical and chemical refining processes applied in the oil industry.

A research laboratory must go beyond this; in Amsterdam attention is devoted to the manner in which the processes worked out by research are applied in actual practice. To this end there are a number of *semitechnical plants*, in which it is ascertained how far the laboratory process can be put into practice. In these semitechnical plants it is also possible to study the technical difficulties that may occur when the method is applied on a large scale, independent of the actual process itself; as such we may mention problems relating to corrosion, choice of material, etc.

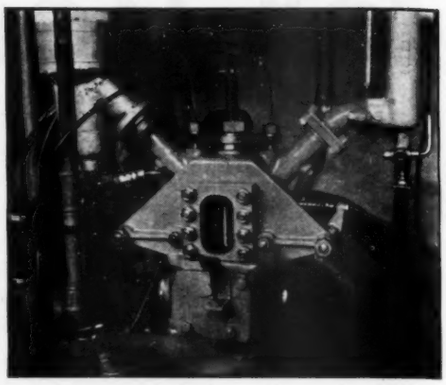
There are also various investigations that can only be thoroughly examined by *practical tests*. Thus the Shell has a laboratory in Delft for testing motor fuels and lubricants, where these products are tested in engines; some of their instruments are also used in Amsterdam for routine testing. To the same category belongs interesting work carried out in Delft and Amsterdam on fuel oil burners, kerosene stoves and many kinds of other apparatus required to make the best use of the special properties of petroleum products.

Five Main Groups

The present organization of Amsterdam laboratory is partly the result of the quick development of this institution in recent years. The laboratory is divided into five main groups of departments for chemical research and several groups for physical, mechanical and other activities. Over and above these groups there are separate departments dealing with the organization, documentation and collection of the resuts of the research work. Finally, there are various auxiliary services of a technical or administrative nature. Now that the laboratory has a personnel of almost a thousand men, all the work has to be carefully organized to gain the most advantage from it. How the research work on such big lines may be organized is described in an article by J. H. Vermeulen *(J.I.P.T., Vol. 23, No. 161, March, 1937, pp. 179-206)*.

Amsterdam laboratory has a comparatively long history behind it. The research work in Holland is carried out at two centers, Delft and Amsterdam; the Delft laboratory dealing with the application of fuels and lubricating oils in internal combustion engines and the Amsterdam laboratory dealing with the fundamental chemical and physical research. Even before 1900 the Royal Dutch had a small research laboratory in its refinery at Rotterdam.

A few years after the formation of the Royal Dutch-Shell combine (1907) the laboratory was transferred (1914) to a plot on the north bank of the river Y at Amsterdam, where it still stands at the present day. Since then its aspect has entirely changed as a result of many rebuildings and enlargements. In the years subsequent to the Great War the development proceeded at a great pace. The total area of the laboratory grounds grew from 4.8 acres (1920) to 32.5 acres in 1937 (3.9 acres being covered by buildings). The old laboratory building was enlarged in 1927 and as early as in 1926 a much larger new laboratory was built next to it. In the same period from 1920



Quartz window in engine permits flame studies

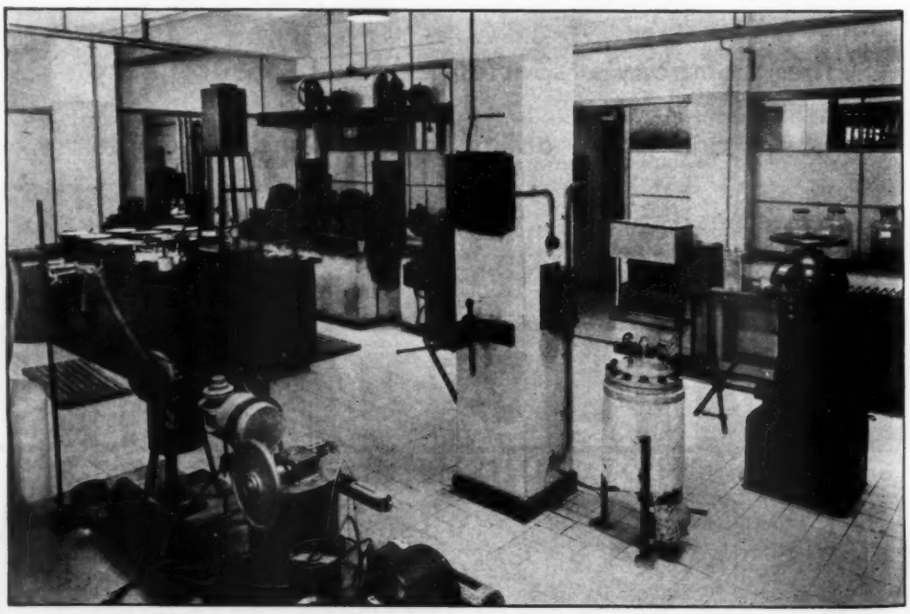
to 1937 the staff increased to 985. This staff consists of 109 university-trained men, 409 analysts, 157 members of the administrative personnel, 203 members of the technical personnel and 107 assistants and workmen.

Owing to the constantly increasing activities in the laboratory, a need was felt for a special training department for new laboratory assistants. Every year some 30 or more young men are trained in the official testing methods and the theory of refining and analysis of petroleum products.

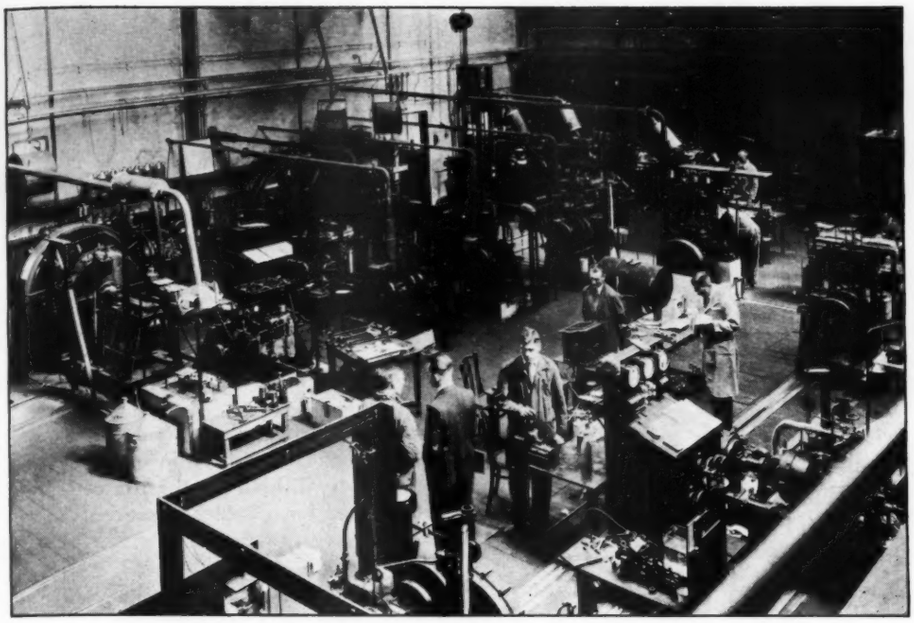
Room Arrangement

The laboratories must be constructed so as to be adaptable under all circumstances. The space inside the buildings was therefore divided by means of removable partition-walls that make it possible to alter the rooms at the shortest possible notice. The benches are all constructed to a standard model consisting of a lower part of two loose halves and a fixed top. A bundle of pipe lines is laid on throughout the laboratory for gas, water, steam, compressed air, vacuum, etc. These run along the ceilings, but are conducted through the floors to the benches of the story above them.

The laboratory is also equipped with special facilities to deal with special tests or ordinary tests under special conditions. For example, there is a room in which a tropical climate can be simulated and also a cold room where materials can be subjected to very low temperatures. There is a separate high-tension installation for the electrical



Apparatus for testing oil well cements



Corner of diesel engine hall in Delft laboratory

testing of transformer oils and similar petroleum products. In another department the laboratory possesses a collection of highly perfected apparatus for fractionating mixtures by boiling or extraction; fractions of a boiling range of only a few degrees can be separated here. The normal stills for distilling and fractionating oils have been centralized in one department.

From the foregoing one might perhaps receive the impression that the Amsterdam laboratory works only at research problems of the refinery. Much research is also done, however, with regard to the production of crude oil. The investigation and composition of mud flushes is important in drilling and this problem is thoroughly studied. There is a special laboratory devoted to the testing of oil well cements and finding the right specifications for them. Investigations into the porosity, permeability and other properties of well-cores are carried out to evaluate oil bearing strata. A great deal of attention is also devoted to the dehydrating of crude oil emulsions, a special department working at this many-sided problem.

Control Purchases

We have already stated how the Amsterdam laboratory contributes to ensuring uniformity in the purchasing of all laboratory apparatus. For this purpose a special department is set apart for testing laboratory apparatus with specially constructed thermostats and all further requisites for rapid and accurate testing. As a large oil company purchases such enormous quantities of material in the form of metal, paint, chemicals, packing, cement and so forth, it was soon realized that the establishment of a section for the control of purchased materials was highly desirable. All these materials are therefore regularly checked in the main laboratories. A special section of the Amsterdam laboratory is equipped with apparatus to test steels, bronzes, alloys, etc., by the most recent methods. Another section tests all the cements for building or for use in oil wells. A third section devotes special attention to the testing of other materials, such as chemicals, paints, packing, etc., which are purchased according to specifications, and samples are regularly taken from the shipments to keep a check on the quality of these materials. When it is realized that the petroleum industry spends about $20,000 per hour on replacing refinery equipment which has suffered from corrosion, the necessity for paying attention to suitable metals and suitable means of protecting them is obvious and the cost of selecting and checking these materials is found to amount to but a small percentage of the original cost.

A few departments are specially equipped for routine analyses, for besides the samples received for the research work, a considerable number of samples are received to be tested for ordinary purposes. Their number varies between 10,000 and 15,000 per year. Besides the research laboratories, which are all more or less uniformly equipped, there are a number of special rooms. Thus, apart from those already mentioned, there is a room for testing lubricants in apparatuses and gasolines in engines.

For the purpose of semitechnical research work there are some satisfactory buildings where there is the apparatus required to develop the processes found by research work at the bench, on a technical, or semitechnical scale. Special semitechnical plants are constructed in these buildings for newly evolved processes. There is a complete paper machine, emulsion plant, Dubbs pilot plant and many forms of apparatus used for distilling, extraction, hydrogenation, cracking and polymerization experiments.

Finally, in order to be able to make or to alter all apparatus and instruments as easily and quickly as possible, the laboratory has its own machine shop, instrument maker's workshop and glass-house attached.

Delft Laboratory

The Delft laboratory of the Royal Dutch-Shell Co. was started in 1928 with six test engines in one small building covering 0.1-acre floor space.

Although its original purpose was research work on oil products, particularly motor fuels and lubricants, it was not long before shortcomings of various constructional details of the engines on the market were detected, which led to engine improvements.

Extension of the laboratory soon became necessary. Today it employs 12 graduate engineers working on more than 50 engines in a complex of buildings covering a floor space of half an acre. It is organized in five departments, viz.: one for diesel fuel, one for gasoline, one for lubricants (lubricating oils, greases and endpoint lubricants), one for heating fuels, and a physical department.

Delft's first problem was to investigate the use of gas oil in carburetor engines.

Then the very important problem of diesel knock in high-speed diesel engines came up. Measuring the knocking properties of diesel fuel by the delay method was developed and the Delft laboratory was the first to express this property in cetene figures.

With regard to gasoline research, the allowable boost ratio was developed especially for aviation fuels. This method allows an extremely exact and practically unlimited measuring of the tendency to knock for fuels above 80 octane, as required in aircraft engines.

The research work often called for measuring devices of which at the time no suitable design was available. So, for instance, the Delft laboratory developed its own high-speed pressure indicators, particularly the one for recording accurately detonation diagrams.

The lubrication department also performed pioneer work in developing its method of continuous measuring of wear in a running engine which gives reliable results within two hours.

The endpoint research led to development of the four-ball apparatus, the four-ball top, the frictio-meter and other instruments, which are now in general use.

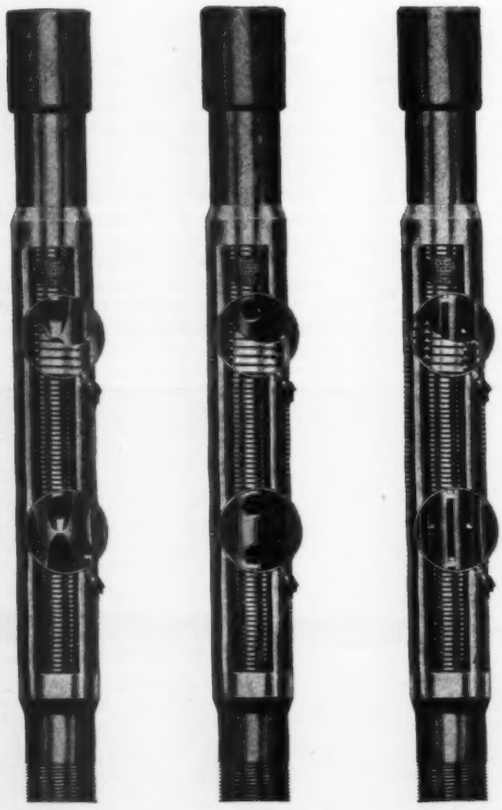
Royal Dutch-Shell refinery at Balikpapan, Netherlands Borneo

THE LAYNE SCREENS and PACKERS

—are recognized the world over for their superior service

Layne Screens are wrapped with a semi-wedge shaped wire with the narrow side next to the pipe. This produces a wedge-shaped opening that flares toward the pipe. The wire is wrapped directly onto the pipe, under pressure and at the proper tension.

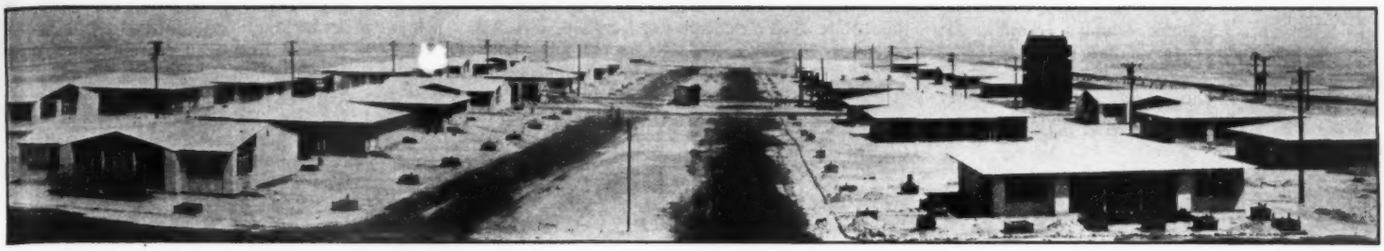
This type of wrapping eliminates clogging, sand cutting, and assures a thoroughly clean wash job. Layne Screen is available with Milled Groove, Plain Drilled, and Slotted Perforations.



Milled Groove *Plain Drilled* *Slotted Type*

Layne has a Packer suitable for every condition. They are simple and easy to use, positive in operation. They give a pack that will hold for the life of the well. They are furnished for all sizes of screen, liner and casing.

Setting Tool *Lead Cone Packer* *Double Seal Packer* *Tubing-Set Packer*



Air-cooled camp constructed by company. Note cooling tower at the right

Bahrein Island Among 15 Largest Oil Producers

By doubling its production in 1937 over the preceding year, the Bahrein oil field attained its full majority the past year and moved up to take its place among the 15 largest producing countries of the world. Production currently is averaging 25,000 bbls. per day and to the end of 1937 approximately 12,500,000 bbls. of crude had been recovered from the field.

Bahrein Island is the largest of a group of islands in the Persian Gulf, 450 miles south and a little east of the famous old Masjid-i-Suleiman oil field in Iran (Persia). Standard Oil Co. of California sent a geologist and an operating man to investigate the island in 1930. Bahrein Petroleum Co., Ltd., a wholly-owned subsidiary of Standard Oil Co. of California, was organized and drilling commenced in 1931. The oil discovery was made in 1932. Since then development has been rapid and the field has been well outlined so far as the 2,000-foot pay is concerned. A modern refinery, described in another article in this issue of The Oil and Gas Journal, has been constructed and housing and recreational facilities for the accommodation of the 450 British and American employes have been erected. At present operations of the company give employment to about 5,000 Bahreins and Indians.

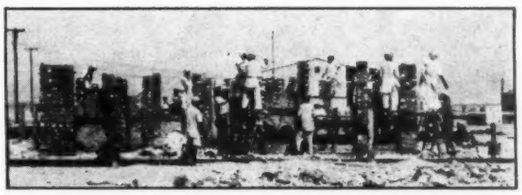
Relief map of island

In 1936, Texas Corp. acquired a 50 per cent stock interest in Bahrein Petroleum Co., Ltd. A statement on this transaction was published in The Oil and Gas Journal of January 21, 1937.

Geology

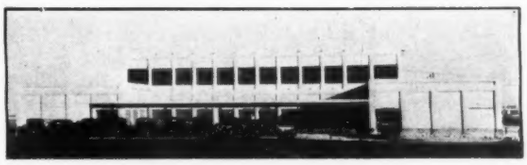
Regionally Bahrein Island lies in a portion of the ancient Tethys geosynclinal belt. The present expression of a portion of this ancient feature can be seen in the Persian Gulf and its northwest extension, the basin of the Tigris and Euphrates rivers. It is believed the structure on Bahrein is the result of compression from the mountain masses of Persia against the crystalline platform of central Arabia, the thrust being absorbed by gentle folding in the geosyncline. Another possible explanation of the Bahrein uplift is salt intrusion. Salt domes are known in Persia, and there is some indication of salt uplifts in southern Iraq and islands of the Persian Gulf, but the evidence is not at all conclusive.

The structure of Bahrein (see structure map, Fig. 1) is that of a large, simple, closed dome about 28 miles long and 10 miles wide covering practically the entire island. The folding is definitely reflected by the topography and may easily be mapped on surface outcrops of Eocene limestones which reveal at least 500 feet of closure. The productive portion of the dome is confined to approximately 11,000 acres on the structural crest in the center of the island. There is no surface or subsurface evidence of



Company house under construction

Tanker loading from floating dock



Air-conditioned office building

Air-conditioned employe theater

faulting. Rocks exposed at the surface consist of:

1. Recent sands and coquinas forming flat raised beaches surrounding the island.
2. Pleistocene sands, cross bedded and probably wind deposited, lying in some canyons.
3. Miocene siliceous clay covering very limited areas
4. Eocene limestone covering the larger part of the island.

The Eocene rocks which are exposed are often siliceous. A section of 290 feet has been measured, largely limestone with some sandy limestone and a fossiliferous clay.

Within the area the Eocene section in the wells drilled consists of about 1,300 feet of soft porous limestone with minor shale breaks which are quite persistent. Micro-fauna are rather abundant in the upper part of the section but are confined to a few long-ranging genera. A heavy tar-like oil occurs irregularly throughout the section, in some cases in such abundance as to impede drilling. Some of the tar shows are exposed at the surface but are of no commercial value. The Eocene limestone is very porous and is the source of most of the water used for domestic and irrigation purposes over the northern half of the island. The water for these purposes is obtained from large springs and many shallow, dug or drilled wells. This shallow water contains about 3,000 parts of salts per million, principally sodium chloride. However, the salt content increases with depth. The first water is encountered in drilling wells at about 10 feet above sea level and, in rotary drilling, all returns are lost at this depth. Additional water pays are encountered at various depths, and the entire limestone section is drilled without circulation.

Geologic Strata

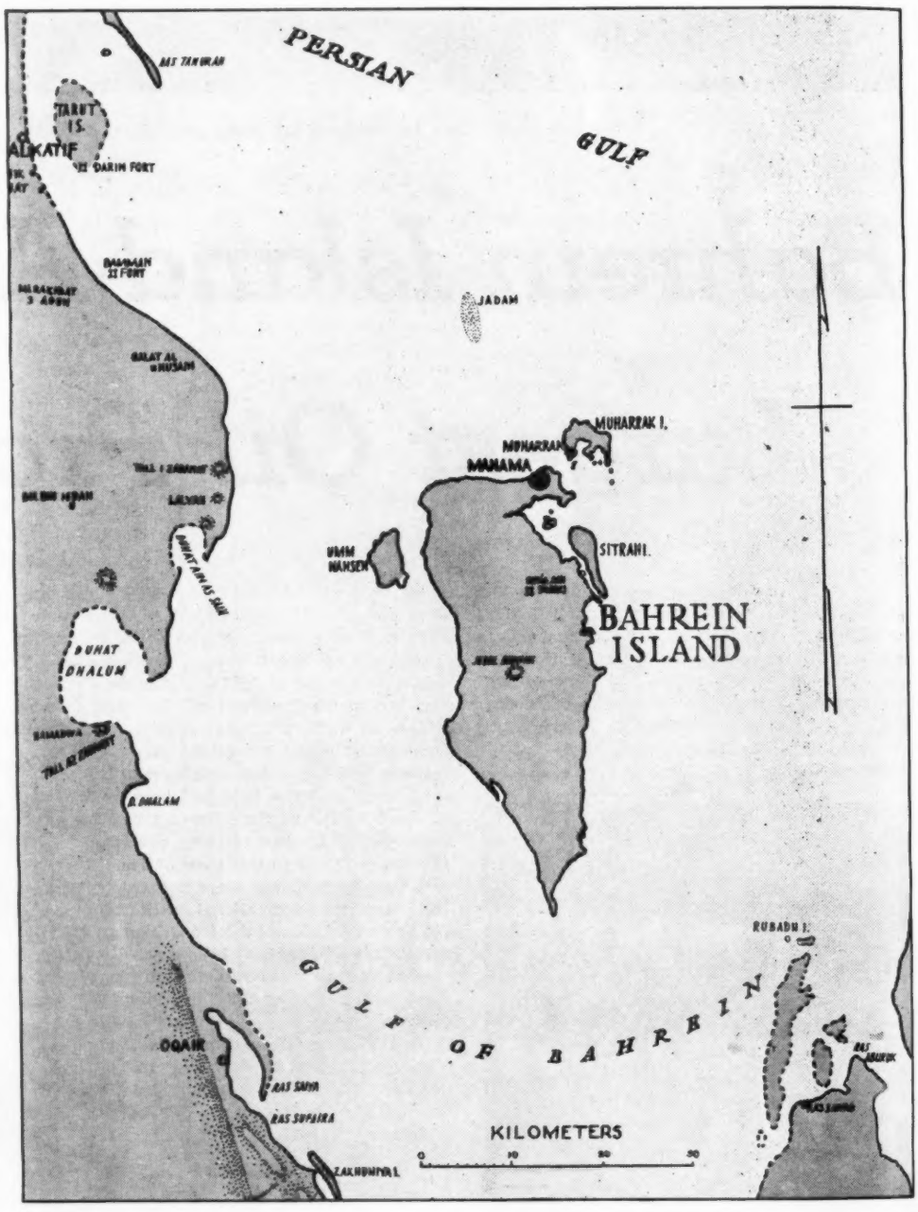
The base of the Eocene, or top of the Cretaceous is placed at the first occurrence of glauconite, though there is some evidence it may be higher. The first 180 feet of Cretaceous consists of a series of limestones and chert. Below the chert there is a 500-foot section of shale with a few limestone streaks which occasionally show oil, one having produced enough to be dignified with the name First Pay. The Main Pay limestone, about 100 feet in thickness, occurs beneath this section, followed by an unknown thickness of siltstones and limestones with some sandstone, shale and anhydrite. The deepest well, No. 52 now drilling, is believed to be in Cretaceous at 4,680 feet although no definite faunal evidence has been found.

The Main Pay limestone section consists of porous gray limestone with interbedded shale. The limestone members have a porosity of from 30 to 40 per cent, some are impermeable, and some produce and have a permeability up to as high as 380 millidarcys. Underlying this limestone section is a series of shales, lenticular siltstones, and fine sandstones which is highly productive in certain parts of the field. The porosity of some of the siltstone members is as high as 40 per cent and the permeability as high as 2,700 millidarcys. The Main Pay lime and these siltstone pays are collectively called the Second Pay.

The water level in the field is found at about 2,175 feet below sea level giving an oil column of 375 feet in the Second Pay producing section. Below the Second Pay, the sections of alternating limestones, siltstones and sandstones carry varying amounts of water. In a few wells caverns which produce as much as 50,000 bbls. of hot water daily are encountered, and all returns are lost, resulting in a difficult drilling problem.

A Third Pay is encountered between 2,700 and 2,800 feet but so far commercial production has been found in only one well. Below the Third Pay, the limestone section is interbedded with some shale streaks and carries water down to approximately the top of anhyarite at 3,965 feet. The section below 3,965 feet down to 4,680 feet consists of limestone with about 50 per cent anhydrite interbedded and interspersed through the limestone.

The most interesting feature in connection with the present development of Bahrein is the recent discovery of a Fourth Pay in well No. 52, a deep test which is being drilled to explore the deeper producing possibilities of the island. Drill stem tests made in short stages have shown an almost continuous gas and distillate-producing section between 4,165 and 4,640 feet. A tremendously large gas reserve is indicated with about 250 bbls. of 60° A. P. I. distillate per million feet of gas produced. Below the section carrying distillate, drill stem tests have revealed dark oil production. The vertical extent and potentialities of the dark oil zone have not yet been determined.



Bahrein Island in the Orient two weeks by fastest mail from the United States

Drilling

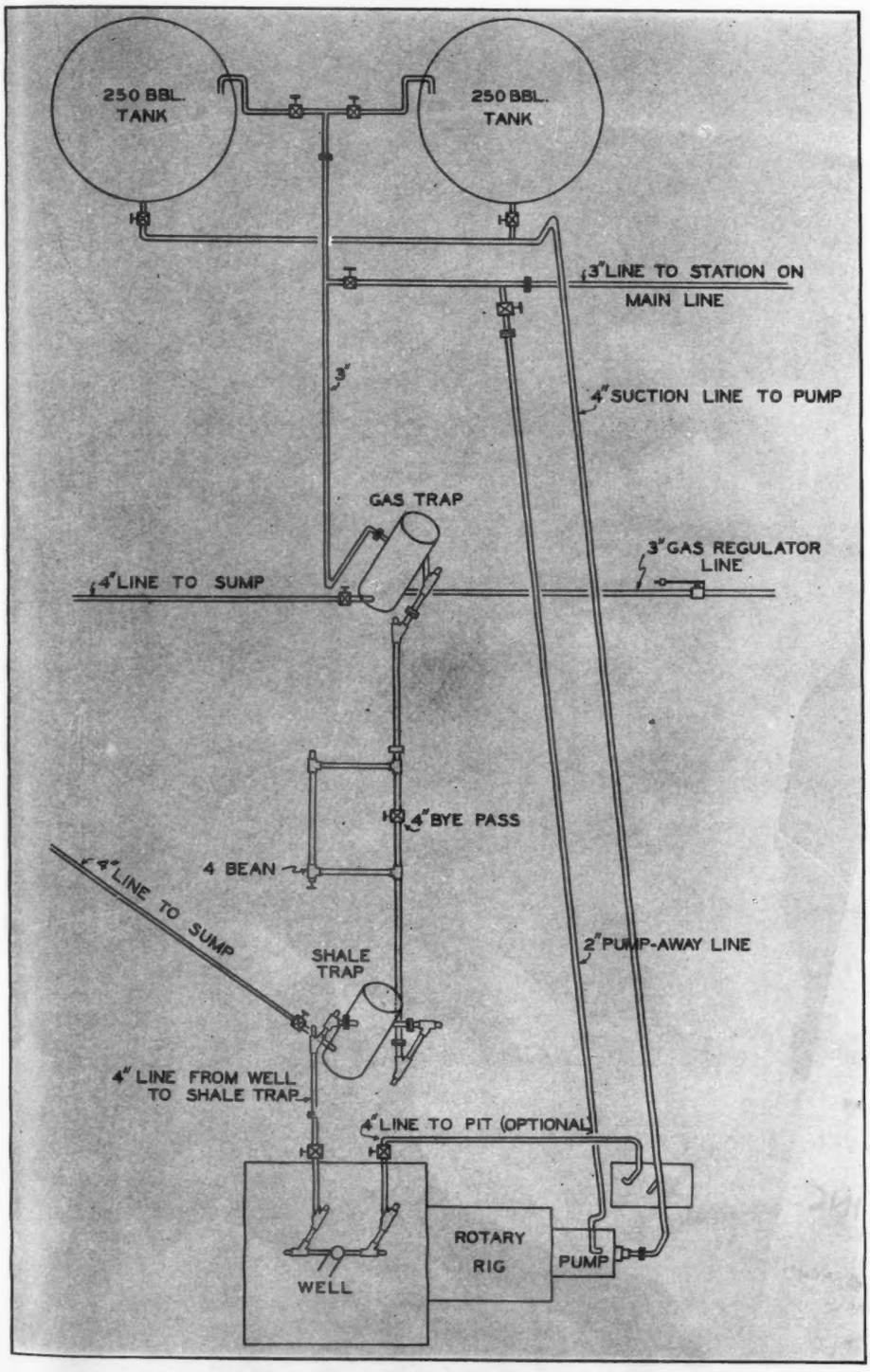
The discovery well came in during June, 1932, and since that time 45 wells have been completed on 3,000-foot spacing as producers from the Second Pay zone at an average depth of 2,250 feet. One string of tools is now completing the 3,000-foot spacing program and it is planned to do no further drilling to this pay until well spacing studies indicate that additional wells are necessary for highest economic recovery.

There has been considerable experimentation in drilling methods. Drilling to the Second Pay zone is now somewhat standardized and is done with portable gasoline-engine-driven rotary equipment. A large saving in time and cost results from drilling all hole with this portable rotary equipment as compared with steam equipment and as compared with a previously used combination method in which the first 1,500 feet of cavernous limestone was drilled with spudders. Several wells were drilled entirely with cable tools, and were drilled-in under pressure using conventional oil savers and lubricators; but, drilling time was slow, and it was practically impossible to drill through the pay section because of the large amount of oil produced and the difficulty in bailing shale cuttings off bottom. The present drilling procedure is to drill with rock bits through the 1,500 feet of cavernous limestone without returns but pumping

down a sufficient volume of water to carry the cuttings back into the caverns; 9-inch, 34-pound casing is cemented at 1,500 feet; the next 500 feet of shale is drilled with rock bits and makes its own mud; 6⅝-inch 26 pound casing is cemented in the top of pay at about 2,000 feet; the well is drilled-in under pressure circulating oil; flow tests are made each 25 feet, and drilling-time and sample logs are are kept; upon reaching the total depth, the flow of oil is shut off with a pump-down casing plug and a 4¾-inch 16 pound slotted liner is run on drill pipe; and 2-inch U. E. tubing is run under pressure. The total drilling time including rigging up and tearing down, and cement time is between 30 and 35 days.

The practice of drilling-in under pressure was adopted when it became evident that drilling-in with weighted mud often damaged the pays. An added advantage of pressure-drilling these wells is that an accurate log of the location and productivity of the several irregular pays is obtained. It has been possible to obtain only a few cores of the soft producing limestone, and almost nothing can be learned of the location of the pays unless the well is drilled-in flowing. The disadvantages of pressure-rotary drilling in Bahrein have been the added fire hazard and the possibility of coning-in water; the cost is approximately the same and the drilling-in time only slightly longer. The Bahrein drilling experience has demonstrated the practicability of drilling with rotary under pressure 200 to 500 feet of hole which is predominantly shale with interbedded limestone and sandstone.

The potential of the wells after acidization ranges between 250 and 50,000 bbls. or more daily, The potential of a well usually can be estimated roughly from the position on structure, both the limestone and the siltstone sections being more permeable near the crest of the structure. About 30 wells have been acidized to increase productivity and flowing characteristics and productivity on the average has been tripled.



Hook-up used when drilling in under pressure

Production

The oil is gathered through long flow lines into five tank batteries where it is degassed, the oil gauged, and the gas metered. The oil is pumped from the field tanks to storage at the refinery. The cumulative production to November 1, 1937, was about 12,500,000 bbls. and the present rate of production is about 25,000 bbls. daily. All wells are flowing against back pressure of from 375 to 425 pounds per square inch.

Comprehensive engineering studies of reservoir fluids and mechanics, and individual well performance are a routine part of the producing activities, and the operation of the field is guided accordingly. Periodic surveys of shut-in reservoir pressure are made using conventional spring-type depth pressure recorders and also the Anglo-Iranian Oil Co. sensitive compressed-air type depth pressure indicator. The reservoir crude is undersaturated with gas and there is no free gas cap in the main pay; the saturation pressure is approximately 325 pounds per square inch and the reservoir pressure is approximately 1,150 pounds per square inch. The gas-oil ratio averages about 150 feet per barrel. The composition of the gas is rather unique in that it contains 30 per cent methane, 28 per cent ethane, and 26 per cent propane.

Pressure decline and water encroachment data indicate that reservoir fluid withdrawal has been followed by water advance. The advance of water has not been entirely free but is retarded somewhat, possibly by low permeability off structure beyond the producing limits of the field.

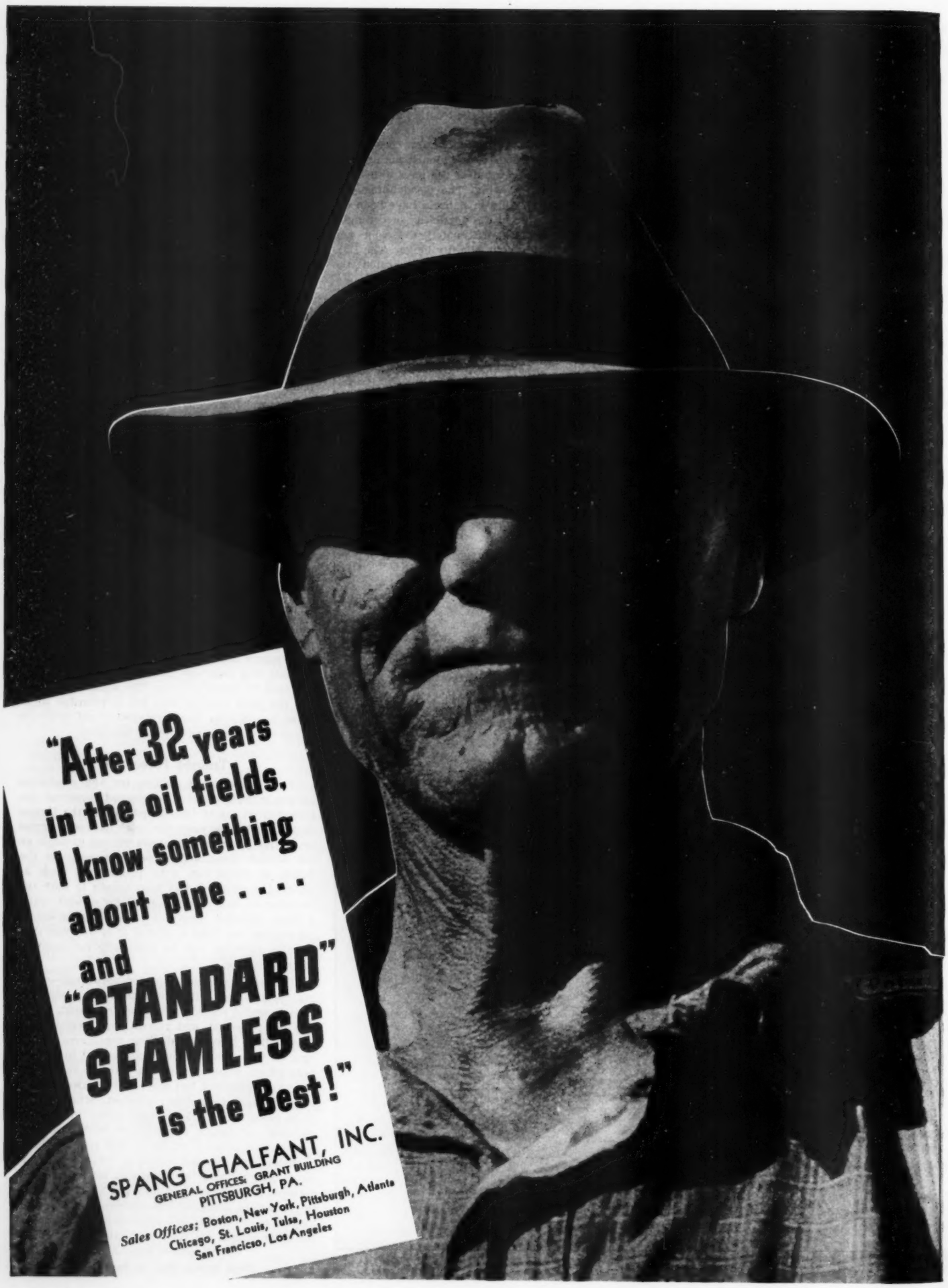
Trained Personnel

The operations of drilling for and producing oil are entirely directed by trained personnel imported from the United Kingdom and the United States. During the years this work has been carried on, native Bahreins have been trained to assist on the derrick floor, and to perform many of the duties in connection with production, such as gauging. As English has been taught in both the government and mission schools for several years, a fairly plentiful supply of young, English-speaking natives has been available. It is the plan that training facilities will be materially increased in the near future.

The welfare of the imported personnel—refining, producing, and maintenance—has also received careful consideration and treatment. Housing, health, social, and recreational facilities are outstanding. The first drilling contingent to arrive on the island in 1931 was housed in Nissen huts which, while serving the purpose for which they were intended, left much to be desired in the way of general, all-round comfort. When operations passed the wildcat stage, large, high-ceiled buildings of native construction with spacious, screened verandas on all sides were built for both bachelor and married quarters. The latest construction consists of well-insulated, air-conditioned cottages for families, and four and six-room units for bachelors, designed and equipped to offer the maximum of comfort and convenience. Portions of the older houses are also being air-conditioned. A

(Continued on Page 134)

(Cross Section Map on Page 133)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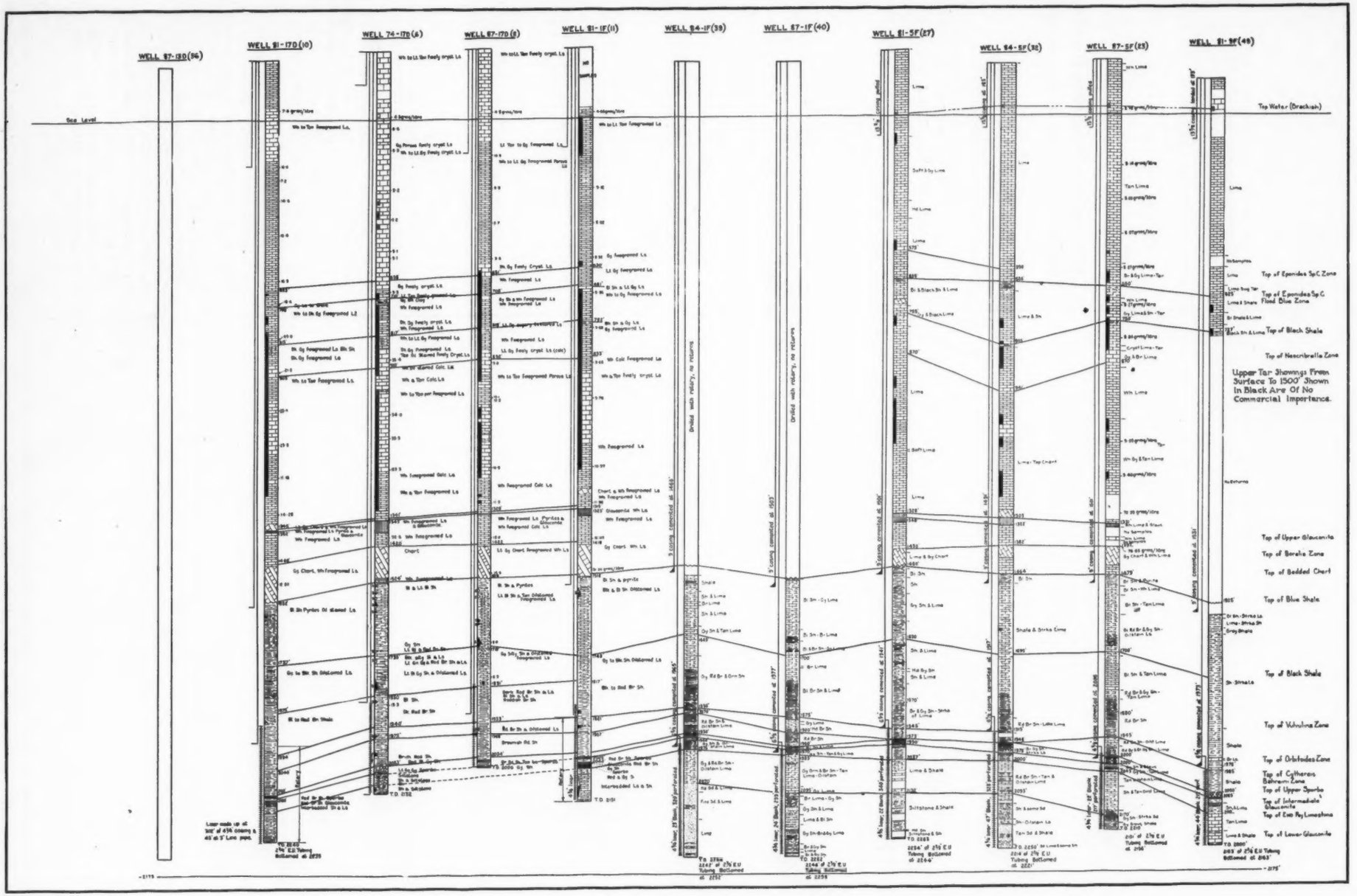
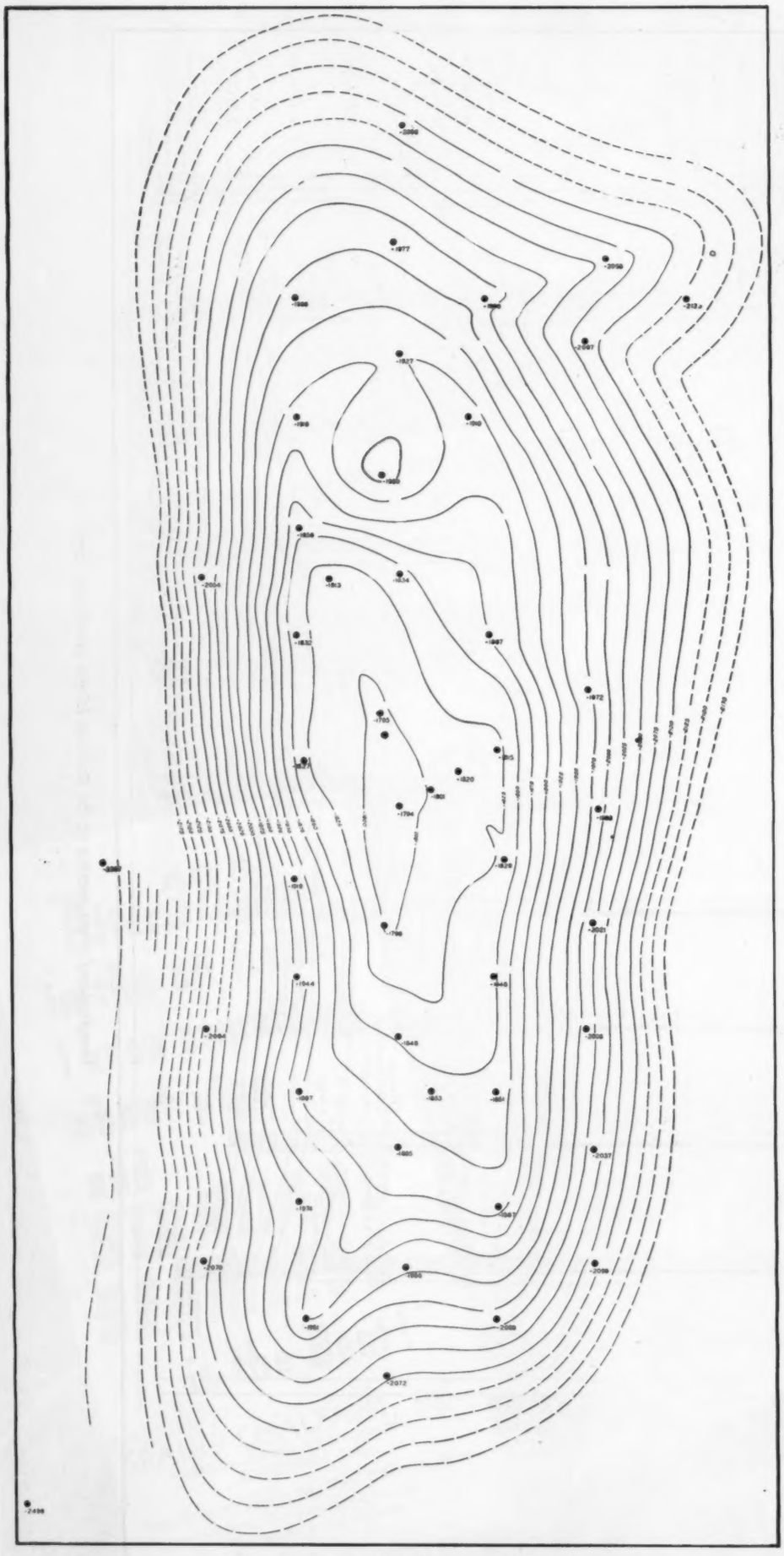


Longitudinal cross section of the Bahrein Island producing area



Contours on top of second pay limestone

modern, completely air-conditioned hospital, efficiently staffed with American and British doctors, has recently been completed. A well-equipped club house constitutes the center of recreational activities; and facilities are provided for tennis, squash, golf, volley ball, cricket, soccer, fresh and salt water swimming, yachting and motor boating. An air-conditioned theater where the latest moving pictures are shown several times a week also houses the school, over which an English teacher will preside. These phases of the Bahrein enterprise are, in the last analysis, at least as important as those which are purely technical.

Lubrication Progress Reviewed Before Petroleum Association

Lubrication research abroad has for its goal the solution of many problems that do not differ greatly from those uppermost in our minds, Dr. J. C. Geniesse of the Atlantic Refining Co. pointed out before the semiannual meeting of the National Petroleum Association at Oil City, Pa. Oil stability to heat and oxidation, oiliness, engine wear, extreme pressure lubrication and long bearing life are receiving the greatest amount of study, he stated.

Conditions of operation for vehicular engines in Europe differ somewhat from those encountered in America. In general, atmospheric temperatures do not vary as widely. This is particularly true in England, where minimum temperatures seldom fall below 15° F. Maximum temperatures are also more mild. On the other hand, he said, the use of lower power-weight ratios indicates more frequent use of full engine power with resultant higher engine temperatures.

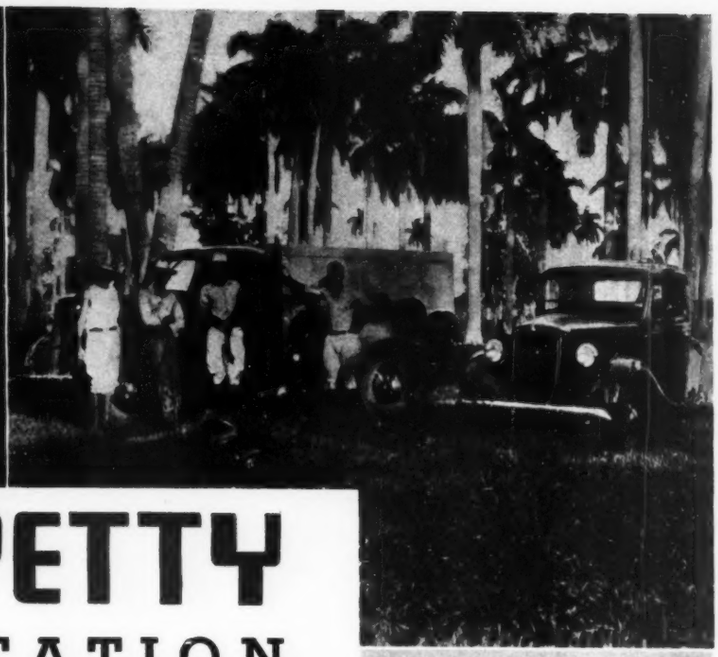
"According to Alex Taub, British engines wear more rapidly because of insufficient oil supply to pistons and rings. He recommends a more copious supply together with efficient oil control rings, pointing out that a large oil supply does not necessarily mean high oil consumption.

"Oil stability tests and their significance is probably the most popular subject at the present time. Mr. Moerbeck of the Royal Dutch Shell Co., in a study of oxidation tests for lubricating oils, points out that too many of them have been adopted. In spite of the fact that no correlation exists between them and practice they are being included in specifications.

"Hanson and Egerton present evidence to show that the oxides of nitrogen, in concentrations corresponding to those in exhaust gas, accelerate viscosity thickening in an oxidation test conducted at 420° F. Evans and Kelman of Wakefield determined the effect of metal soaps at 356° F. When correlated with engine it was found that the oleates of tin, chromium and nickel were quite effective for reducing combustion chamber deposits, particularly when tetraethyl lead was present.

"Mardles and Ramsbottom studied the effect of temperature on oxidation rates. Below 400° F. the reaction rate roughly doubles for each increase of 20° F. Above 400° F. the interval is 40° F. By altering temperature and time of oxidation it is possible to reverse the relative order of merit of a given series of oils. Moutle, Dixmier and Lion of the Aeronautical Division of France propose alternate oxidation at 212°-284° F. and 572°-752° F. in order to produce chloroform insoluble products which are always present in used oils.

"Bouman of Shell presented evidence obtained in an engine tested with three oils showing that the amount of carbon deposition in the combustion chamber is in the reverse order to that formed in the ring grooves, pointing to the advisability of using different tests for the two characteristics."



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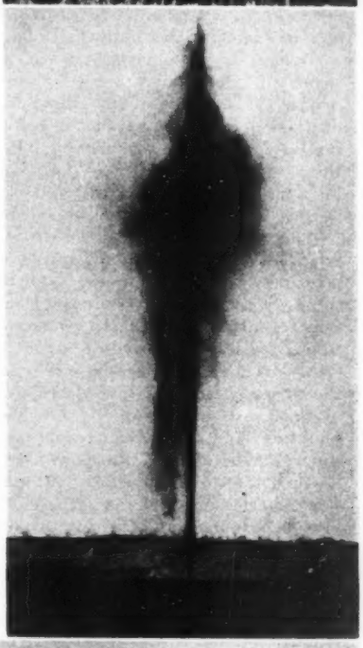
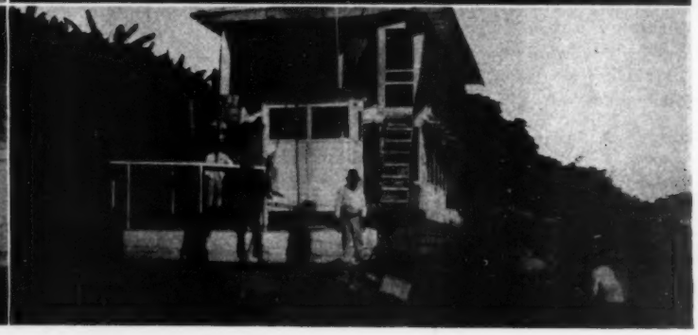




Five Deep Test Wells Are Being Drilled in United Kingdom

Five deep tests are at present being put down in Great Britain; three by D'Arcy Exploration Co., Ltd. (the development company of Anglo-Iranian Oil Co., Ltd.,) at Kingsclere in Hampshire on the south coast; Eskdale in Yorkshire in northeastern England, and Cousland in Midlothian, southeastern Scotland; one by Steel Brothers & Co., Ltd., at Edale, Derbyshire, central England; and one by Anglo-American Oil Co., Ltd., at D'Arcy, in Midlothian.

Deep tests have already been completed and abandoned at Portsdown in Hampshire (6,556 feet). Henfield (5,105 feet) and Grove Hill (3,506 feet), both in Surrey on the south coast.

During the present year Captain Harry Crookshant, M.P., Secretary for Mines, announced that two prospecting licenses under the Petroleum (Production) Act, 1934, and the Petroleum (Production) Regulations, 1935, had been issued by the Board of Trade to Steel Bros. and Co. Ltd., covering approximately 350 square miles in Yorkshire, Derbyshire, Cheshire and Lancashire.

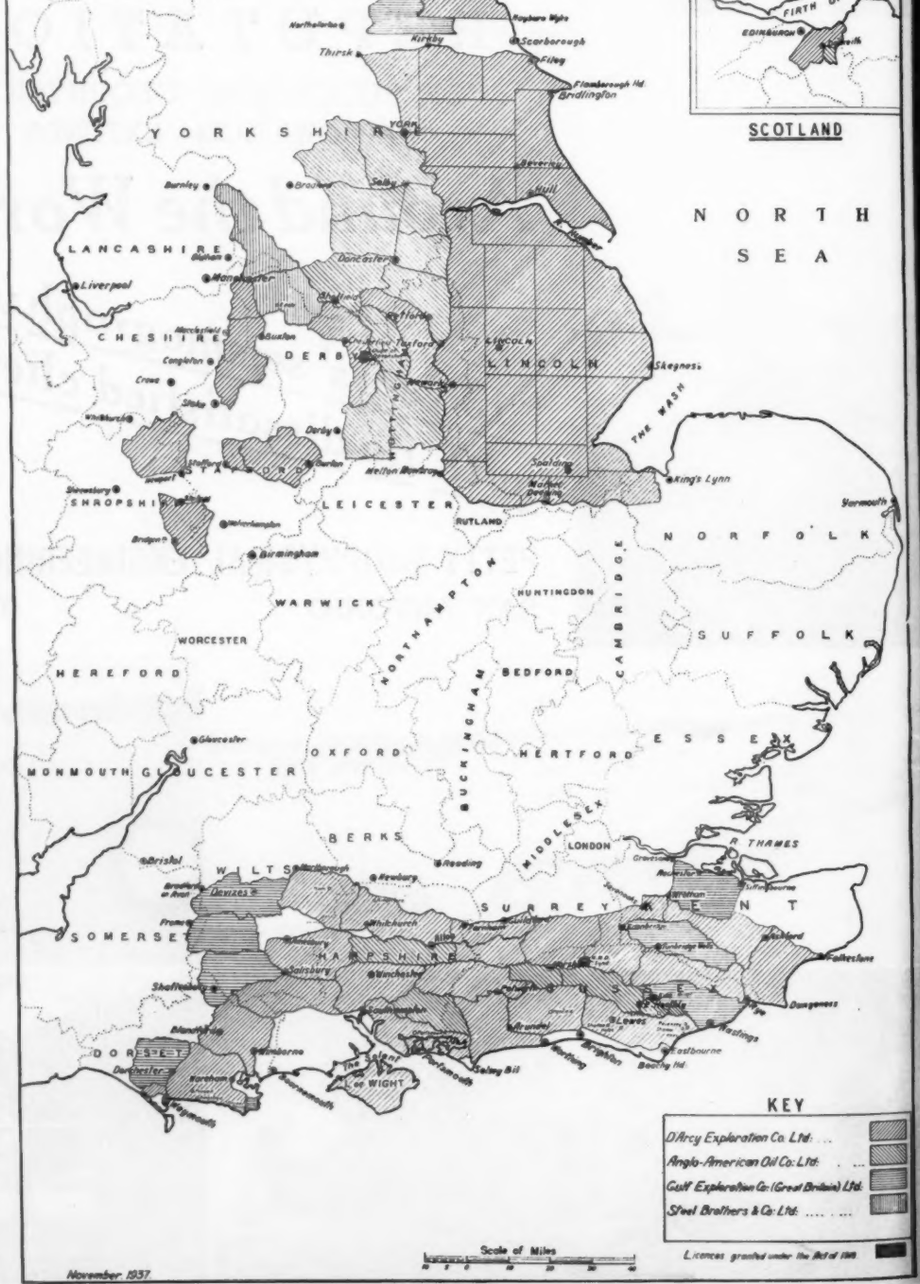
Three licenses were also issued to D'Arcy Exploration Co. Ltd., (Anglo-Iranian) covering approximately 535 square miles in Derbyshire, Cheshire, Staffordshire, Wiltshire and Hampshire. The same company was granted an extension of two licensed areas previously granted to it, to embrace additional areas aggregating 103 square miles in Dorsetshire, Hampshire and Surrey.

In April 10 licenses were granted to D'Arcy Exploration Co. Ltd., covering approximately 1,649 square miles in Kent, Sussex, Surrey, Yorkshire, Nottinghamshire, Derbyshire, Staffordshire, Shropshire and Cheshire, and nine licenses were granted to Gulf Exploration Co. (Great Britain) Ltd., covering areas aggregating about 1,277 square miles in Kent, Sussex, Dorset, Wiltshire, Somerset and Yorkshire.

Twelve additional prospecting licenses were granted in October to Anglo-American Oil Co., Ltd., covering approximately 1,848 square miles, in Durham, Yorkshire, Nottinghamshire, Leicestershire, Lincolnshire and Derbyshire.

The present drilling development in the United Kingdom began after the enactment of the Petroleum (Production) Act, 1934, and of the Petroleum (Production) Regulations, 1935. The licenses granted the first year covered areas amounting to a total of nearly 7,000 square miles. The first batch of thirty prospecting licenses was granted to D'Arcy Exploration Co. Ltd., (Anglo-Iranian) and covered areas totalling 5,438 square miles in Surrey, Sussex, Hampshire, Dorset, Wiltshire, Yorkshire, Lincolnshire, Nottinghamshire, Leicestershire, Rutland, Cambridgeshire and Norfolk. An additional nine prospecting licenses was granted to the D'Arcy company covering an aggregate area of 1,508 square miles in Surrey, Sussex, Hampshire, Dorset, Wiltshire, Berkshire and Mid and East Lothian. The D'Arcy company commenced geological and geophysical work, including some shallow drilling, in several of the areas and in March, 1936, the first deep test was commenced at Portsdown Hill, near Portsmouth.

In September, 1937, Anglo-American abandoned its well at Hellingly, in Sussex, at 3,506 feet. An oil reaction was obtained from the sands but not of commercial significance, indicating, it was believed, that there has once been petroleum there but it had escaped in the course of sedimentation. This well, as also those at Portsdown and Henfield, disclosed inadequate porosity in the strata to retain the oil. Consequently hope for oil in the Jurassic strata in the south of England is discouraged. The Hellingly well penetrated the Jurassic on the Grove Hill anticline; the Portland sands between 1,000 and 1,100 feet; the Coralian, 2,230-2,414 feet; the Oolitic limestone at 2,600-2,935 feet; then the Lias, and it was first thought the Carboniferous at 3,450 feet but there was no sign the drill reached any structure in that formation. The drilling equipment was removed to Midlothian, Scotland.



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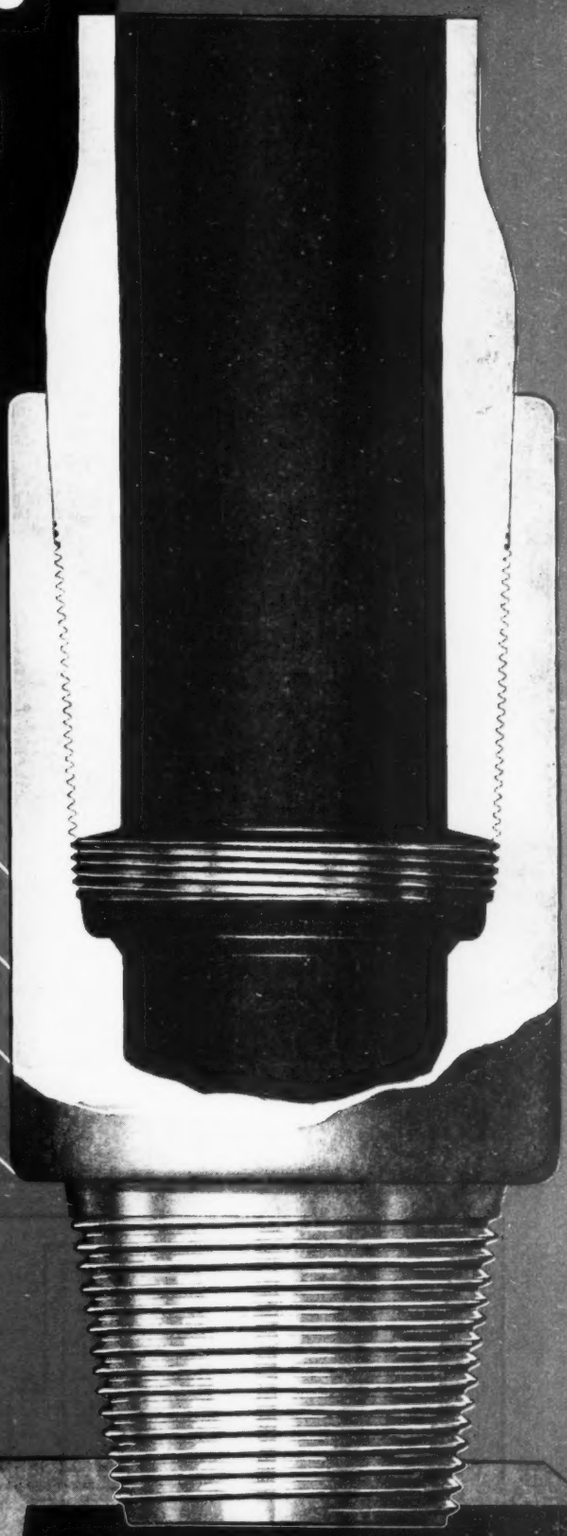

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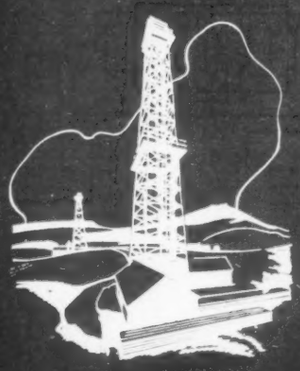

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Combine Many Operations in Single Oil Refining Unit

A number of foreign refinery installations have been completed and others are in progress as a result of developments in producing high octane gasoline from various sources and in producing cracked gasoline from liquid and vapor phase cracking systems.

Notable among recent units are those installed in South America, Iran, Russia, Japan and India. Certain of these were designed for the production of high octane fuel from various grades of crude, and also from field gas, with sufficient flexibility to handle refinery cracked gases containing a high percentage of unsaturates. Developments have demonstrated the importance of combining the polymerization unit with the cracking unit, utilizing a common gas recovery system, fractionating system and treating plant. Integration of these units gives maximum yields at low operating costs and effects major economies in design.

The inclusion or addition of an efficient polymerization process produces a maximum yield of gasoline from any crude charge regardless of varying operating conditions. The increase in yield, due to the additional polymerized gasoline, reflects a further increase in yield by permitting the production of a higher endpoint straightrun gasoline or reduced reforming losses, and in many instances the elimination of the reforming unit entirely. In cases where reforming is essential, the amount of charge to the reforming unit has been materially reduced by the addition of a polymerization unit.

In order to obtain a maximum octane a relatively high percentage of gas is produced. By charging this gas to the polymerization unit a blending stock, very high in octane blending quality, is obtained. This provides both increased yield of cracked gasoline and an increased octane value of the finished gasoline.

In the installations handling crude oil of a relatively high naphtha content, the inclusion of a polymerization unit proved much more suitable than a reforming unit.

A recent Alco Products Co. refinery installation incorporates these latest features for producing maximum yields of high octane gasoline, with emphasis on separately controlled viscosity breaking and heavy and light gas oil cracking zones.

A typical installation, engineered within the past year, combines topping, cracking, polymerization, gas recovery, fractionating and gasoline treating units as shown in a simplified flow chart accompanying this article.

Description of Operation

Fresh crude from storage is pumped serially through reflux and gas oil side stream heat exchangers of the topping stage, and circulating oil exchangers of the cracking stage. The preheated charge is then introduced into a settling drum where any salt water is withdrawn under pressure. The dehydrated crude leaving the settling drum flows through an additional exchanger on the cracking unit, thence through a crude furnace with an outlet temperature sufficient to effect the desired degree of vaporization, and is then introduced into the flash zone of the crude fractionating tower.

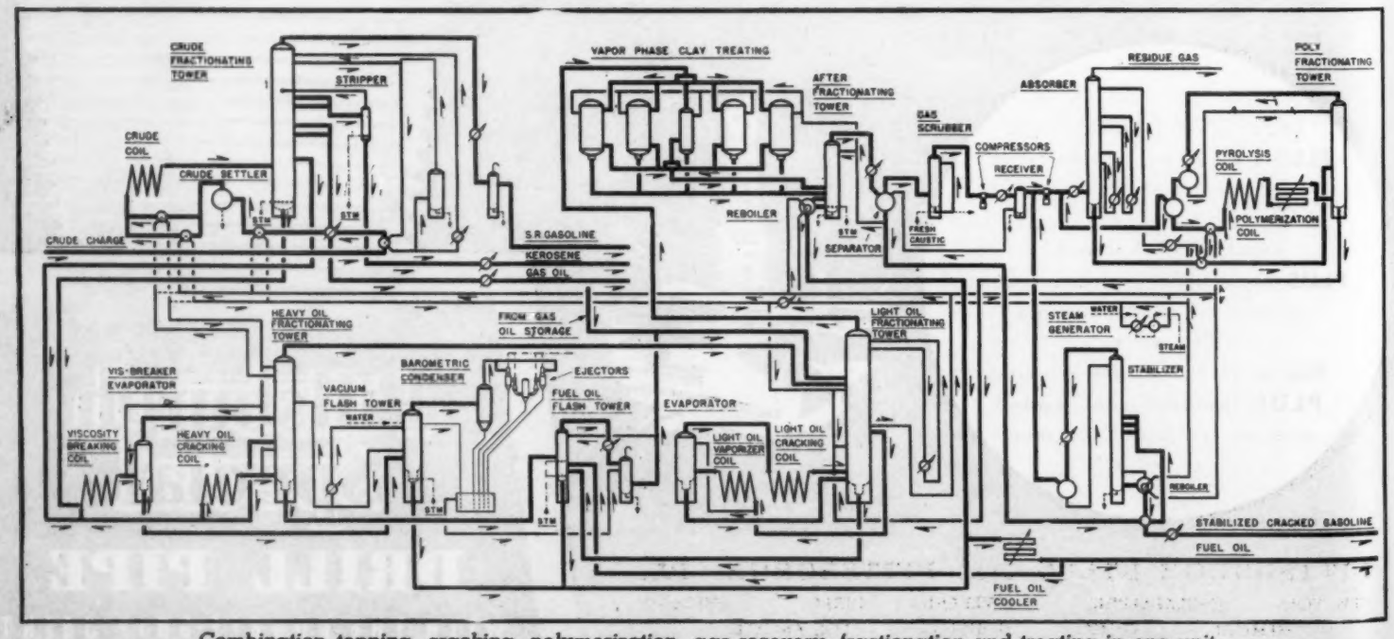
In the crude fractionating tower the ascending vapors are contacted by reflux, maintaining equilibrium conditions on each bubble tray. The overhead from this tower, consisting of gasoline vapors and steam, flows to a vapor condenser where substantially complete condensation is effected. The condensate flows to a water separator where the condensed steam is removed and the net yield of straightrun gasoline then flows to an intermediate gasoline storage tank. The endpoint of the overhead gasoline is controlled by pumping a liquid reflux through a heat exchanger and cooler, back to the top tray of the fractionating tower.

A side stream of kerosene is removed from a selected tray in the fractionating tower and flows to an independent external stripping section where the desired flash specifications are maintained. The kerosene leaving the base of the stripping tower flows through a final cooler to storage.

A liquid side stream of gas oil is removed directly from the fractionating tower and flows by gravity through an exchanger and final cooler to storage.

To give flexibility, a side stream of heavy gas oil is removed from the crude fractionating tower which may be introduced into the upper section of the heavy oil fractionating tower of the cracking unit. The bottoms from the crude fractionating tower are pumped hot through the viscosity breaking furnace where the desired degree of viscosity breaking is effected under optimum temperature and pressure conditions, and is then introduced into the visbreaker evaporator. The vapors from the visbreaker evaporator are introduced into the heavy oil fractionator above the pan. The bottoms from the evaporator are introduced into a vacuum flash tower where the heavy cracking stock is removed and the bottoms flow through the fuel oil cooler to storage.

The bottoms from the heavy oil fractionating tower flow to the upper section of the fuel oil flash tower where the fuel oil is stripped to final specifications and pumped through the fuel oil cooler to storage. The overhead leaving the fuel oil flash tower flows to a vapor condenser where essentially complete condensation is effected and the condensate introduced into a distillate accumulator



Combination topping, cracking, polymerization, gas recovery, fractionation and treating in one unit

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The Products

DIAMOND 760 MOTOR OIL—The leader of the Diamond line of trademarked lubricants and a product of highest quality. High heat resisting . . . low cold test . . . 100% paraffin base. Available in 1-quart, 5-quart and 5-gallon lithographed containers, as well as in drums and barrels.

FAULTLESS MOTOR OIL—100% paraffin base . . . second only to Diamond 760. Available in 1-quart, 5-quart and 5-gallon lithographed containers as well as in drums and barrels.

BRIGHT STOCKS—Mid-Continent bright stocks enjoy an enviable reputation for quality among jobbers and compounders at home and abroad. High flash and fire . . . low carbon . . . superior outer tone . . . viscosities from 100 at 210 to 200 at 210.

NEUTRAL OILS—An outstanding line of pale neutrals with unprecedented acceptance in both domestic and foreign markets. Viscosities as high as 600 at 100 . . . high flash . . . low pour . . . extremely low carbon residue . . . excellent color.

SOLVENT EXTRACTED OILS—A complete line produced by a process owned and controlled by Mid-Continent Petroleum Corporation. High viscosity index . . . low volatility . . . light color . . . excellent outer tone . . . high gravity . . . resistant to oxidation . . . extremely low carbon residue.

STEAM REFINED CYLINDER STOCKS—High flash and fire . . . low carbon residue . . . low pour . . . excellent green color . . . finest quality.

BLACK OILS—TRANSMISSION OILS—High flash . . . low sulphur content . . . low pour . . . any viscosity from 50 at 210 to 5000 at 210. The exclusive choice of many motor car manufacturers, as well as jobbers and compounders, whose preference is based on exhaustive test and long experience.

INDUSTRIAL OILS—Turbine, dynamo, diesel, steam cylinder and all grades of industrial oils manufactured to specifications.

PARAFFIN WAX—Unusually long fibre . . . excellent color and odor . . . recognized as the highest quality of semi-refined crude scale wax on the market.

PETROLATUM—Melting points 140-145, 145-150, 150-155.

The Service

Mid-Continent maintains complete facilities for handling shipments in bulk, drums, barrels and smaller packages from the port of New Orleans. Bulk and barrel stocks are carried at convenient points throughout the United Kingdom and Continental Europe.

La Source

Depuis 15 ans, les lubréfiants de la Mid-Continent Petroleum Corporation jouissent d'une renommée enviable pour leur qualité supérieure, régulièrement soutenue. Ils sont connus dans tous les pays civilisés, et à l'heure actuelle Mid-Continent figure parmi les principaux exportateurs des Etats-Unis.

Les Produits

HUILE A MOTEUR DIAMOND 760—Au premier rang dans la série Diamond de lubréfiants sous marque de fabrique et un produit de la plus haute qualité. Grande résistance à la chaleur . . . essai de froid intense . . . base de paraffine 100%. Logée dans des boîtes lithographiées de 1 quart, 5 quarts et 5 gallons, ainsi qu'en tambours et en barils.

HUILE A MOTEUR FAULTLESS—Base de paraffine 100% . . . n'est dépassée que par l'huile Diamond 760. Logée en boîtes lithographiées de 1 quart, 5 quarts et 5 gallons, ainsi qu'en tambours et en barils.

HUILES CLAIRES—Les huiles claires Mid-Continent jouissent d'une réputation enviable pour la qualité parmi les grossistes et les doseurs sur le marché national et à l'étranger. Points d'inflammation et de combustion élevés . . . faible teneur en carbone . . . Aspect extérieur excellent . . . viscosités de 100 à 210 jusqu'à 200 à 210.

HUILES NEUTRES—Une série remarquable de produits neutres pâles ayant un record sans précédent de succès sur les marchés nationaux et étrangers. Viscosités allant jusqu'à 600 à 100 . . . haut point d'inflammation . . . bas point de coagulation . . . résidu de carbone très faible . . . excellente couleur.

HUILES EXTRAITES PAR SOLVANTS—Une gamme complète produite par un procédé qui est contrôlé et propriété de la Mid-Continent Petroleum Corporation. Coefficient de viscosité élevé . . . faible volatilité . . . coloris clair . . . aspect extérieur excellent . . . forte densité . . . résistance à l'oxydation . . . résidu de carbone très faible.

HUILES DE CYLINDRE RAFFINEES A LA VAPEUR—Hauts points d'inflammation et de combustion . . . faible résidu de carbone . . . bas point de coagulation . . . excellente couleur verte . . . qualité extra-supérieure.

HUILES NOIRES—HUILES DE TRANSMISSION—Haut point d'inflammation . . . faible teneur de soufre . . . bas point de coagulation . . . toute viscosité depuis 50 à 210 jusqu'à 5000 à 210. Le choix exclusif d'un grand nombre de fabricants d'automobiles, ainsi que de grossistes et de doseurs, dont la préférence se base sur des essais poussés et une longue expérience.

HUILES INDUSTRIELLES—Huiles de turbines, dynamos, Diesel, cylindres à vapeur, et toutes les catégories d'huiles industrielles fabriquées sur spécifications.

CIRE DE PARAFFINE—Fibre d'une longeur exceptionnelle . . . couleur et odeur excellentes . . . reconnue comme la plus haute qualité de cire de pétrole brut semi-raffinée sur le marché.

PETROLATUM—Points de fusion 140-145, 145-150, 150-155.

Le Service

Mid-Continent dispose de facilités complètes pour faire les envois en vrac, tambours, barils et plus petits récipients par le port de la Nouvelle-Orléans. Les huiles en vrac ou en barils sont transportées à des points convenables de la Grande-Bretagne et de l'Europe Continentale.

La Fuente

Desde hace 15 años, los lubricantes de la Mid-Continent Petroleum Corporation han gozado de una envidiable reputación a causa de su invariable excelente calidad. Se conocen en todos los países civilizados y actualmente la Mid-Continent figura entre las principales exportadoras de lubricantes de los Estados Unidos.

Los Productos

ACEITE DE MOTOR DIAMOND 760—El primero en el surtido Diamond de lubricantes vendidos bajo su marca de fábrica. Es un producto de primer orden, en todo sentido. Gran resistencia al calor . . . bajo punto de congelación . . . base de parafina de 100%. Se suministra en envases litografiados de 1 cuarto, 5 cuartos de galón y de 5 galones, lo mismo que en tambores y barriles.

ACEITE DE MOTOR FAULTLESS—Base de parafina de 100% . . . solo es sobrepasado por el aceite Diamond 760. Se suministra en envases litografiados de 1 cuarto, de 5 cuartos de galón y de 5 galones, lo mismo que en tambores y barriles.

ACEITES CLAROS—Los aceites claros Mid-Continent gozan de merecida reputación por su superior calidad entre los comerciantes al por mayor del ramo y los mezcladores de lubricantes, en los mercados nacionales y en los del extranjero. Puntos de inflamación y de combustión elevados . . . leve contenido de carbón . . . Aspecto exterior excelente . . . con viscosidades de 100 a 210 hasta a 210.

ACEITES NEUTROS—Una serie notable de productos neutros pálidos, que tienen un precedente sin paralelo en aceptación en los mercados nacionales y del extranjero. Viscosidades hasta de 600 a 100 . . . alto punto de inflamación . . . bajo punto de coagulación . . . residuo de carbón muy limitado . . . color excelente.

ACEITES EXTRAIDOS POR DISOLVENTES—Un surtido completo de aceites producidos por un procedimiento exclusivo de la propiedad de la Mid-Continent Petroleum Corp. Alto índice de viscosidad . . . baja volatilidad . . . color claro . . . aspecto exterior excelente . . . alto peso específico . . . resistente a la oxidación . . . muy limitado residuo de carbón.

ACEITES DE CILINDRO REFINADOS POR VAPOR—Altos puntos de inflamación y combustión . . . poco residuo de carbón . . . bajo punto de coagulación . . . excelente color verde . . . calidad excelente en todo sentido.

ACEITES NEGROS—ACEITES DE TRANSMISION—Alto punto de inflamación . . . limitado contenido de azufre . . . bajo punto de coagulación . . . de toda viscosidad, de 50 a 210 a 5000 a 210. La elección exclusiva de un gran número de fabricantes de automóviles, lo mismo que de comerciantes al por mayor del ramo y mezcladores de lubricantes, cuya preferencia se basa sobre los más exigentes ensayos y larga experiencia.

ACEITES INDUSTRIALES—Aceites de turbinas, dinamos, motores Diésel, cilindros de vapor y todas las categorías de aceites industriales fabricados de acuerdo con especificaciones particulares.

CERA DE PARAFINA—Fibra de una longitud extraordinaria . . . color y olor excelentes . . . aceptada como la cera de petróleo bruto semi refinada más fina del mercado.

PETROLATO—Puntos de derretimiento de 140-145, 145-150, 150-155.

El Servicio

La Mid-Continent disponde de facilidades completas para efectuar los envíos en tanques, tambores, barriles y en envases más pequeños, por el puerto de Nueva Orleans. Los aceites en grandes envases se mantienen en existencia en convenientes puntos en Inglaterra y la Europa Continental.

MID-CONTINENT PETROLEUM CORPORATION

TULSA, OKLAHOMA, U. S. A.

Foreign Representatives:

STERNS, Ltd.
London

ARTHUR BROWN & CO., Ltd.
London

ABCO PETROLEUM CO.
Paris

where the condensed steam is readily removed.

The overhead products (gas, gasoline, and gas oil), leaving the heavy oil fractionating tower are introduced into the light oil fractionating tower where the proper separation between overhead gasoline and cycle stock is accomplished. The endpoint of this material is controlled by reflux circulation. A clean, selected gas oil cracking stock is withdrawn from the reservoir section of the light oil fractionating tower and pumped through the light oil preheating coil and then introduced into an evaporator where true separation of liquid and vapors is effected. The bottoms leaving the evaporator are reintroduced into the light oil fractionating tower. The overhead leaving the evaporator flows through the vapor phase cracking furnace where the desired degree of thermal decomposition is effected and the entire charge is introduced into the base of the light oil fractionating tower where separation of fuel is accomplished. The bottoms leaving the light oil fractionating tower are introduced into the lower section of the fuel oil flash tower where the refractory fuel is brought to the desired initial boiling point specifications before being discharged through the final cooler to storage.

The overhead from the light oil fractionating tower, consisting of cracked gasoline, polymerized gasoline, and noncondensable gas, flow to a Gray vapor phase treating unit which consists essentially of 4 clay towers. These towers are so manifolded that all 4 units may be operated in parallel, or two towers operated in series.

The overhead, consisting of clay treated low endpoint distillate and fixed gas, flows through a vapor condenser and thence to a combination separator and reflux accumulator where separation between the cracked gas and liquid condensate is effected. The gasoline condensate from the accumulator tank is pumped through the stabilizer exchanger and the preheated charge is introduced into the stabilizer tower. The bottoms from the stabilizer are discharged through the bottoms exchanger and final cooler and introduced into an intermediate gasoline storage tank with the straightrun gasoline described.

The overhead leaving the stabilizer flows through a vapor condenser to a reflux accumulator tank, giving sufficient condensate to provide reflux for the stabilizer tower. The gas leaving the reflux accumulator is introduced into the suction of the second stage gas compressor delivering to the absorber.

The gas from the Gray after fractionator accumulator passes through a gas scrubber where hydrogen sulfide is removed by caustic solution and thence passes to the first stage compressor. After separating any liquid in the accumulator the gas is delivered through a gas receiver to the suction side of the second stage compressor.

The rich oil from the absorber is charged through a heat exchanger to the poly fractionator and the overhead gases and vapors from the fractionator are partially condensed and the condensate used as reflux. The vapors pass through an after condenser and the mixture enters the poly feed tank. The gases are vented to the absorber and the condensate becomes the poly feed. Lean gas from the absorber is sent to refinery fuel system. The condensate from the polymer feed tank is pumped through the polymer feed exchangers, thence through the heating surface of the polymerization furnace where the temperature is regulated to effect a partial thermal decomposition and raise the products to the desired reaction temperatures. After leaving the furnace, the high temperature vapors flow through the reaction coil and into the polymer plant fractionator where separation between polymer gasoline and recycle stock is effected. The bottoms from this fractionator are introduced in the light oil fractionator.

Heat, Rain and Mountains Hinder Colombia Drilling

In 1920 the International Petroleum Co., Ltd., acquired control of the Tropical Oil Co. which had a lease from the government of Colombia on the property known as the de Mares Concession. This property is situated approximately 500 kilometers up the Magdalena River from the northern coast of Colombia and 300 kilometers west of the Venezuelan border. Although considerable testing and exploratory work was carried on during the first few years following acquisition of the property, actual exploitation did not commence until 1926, at which time the Andian National Corp. began operating its pipe line in the export of crude oil from the concession.

Climate and General Features

The climate and general operating conditions in the oil fields of Colombia are in marked contrast to those of Peru. As a matter of fact the story of oil development in Colombia concerns itself chiefly with the overcoming of natural obstacles which are due primarily to tropical climate and transportation difficulties.

In the first place all equipment and supplies used in connection with the drilling, producing, and refining of oil have to be transported for a distance of over 500 kilometers up the Magdalena River. Although navigation on this river is generally satisfactory in the rainy season this is not the case during the dry seasons which usually alternate with the wet every three months. During the dry periods of the year river boats with their cargoes frequently get hung up on shifting sand bars causing serious delay in the movement of passengers and freight along the river. It can be readily appreciated that having to depend on this character of transportation necessitates the carrying of adequate supplies on hand as well as the facilities in the field for making many different kinds of articles.

The country along the Magdalena Valley has all the unfavorable features which originate from a combination of excessive heat and heavy rainfall. A mosquito-infested jungle is not the first, but an ever-present problem which confronts operations in the South American tropics. Sanitation vigilance in both working and living conditions is a daily necessity for protection against disease and epidemics peculiar to tropical regions. Added to these is the disadvantage of a prevailing hot and humid climate. Aside from the occasional village along the river bank the country within and adjacent to the Tropical Oil Co.'s concession was practically devoid of human habitation prior to the beginning of development by the company.

Barranca-Bermeja is the river port on the Magdalena through which all equipment and supplies for the field are handled and where the Tropical's refinery is located. The river port is connected with El Centro, the field headquarters, by approximately 30 kilometers of narrow gauge railway built and operated by the company. Oil production at the present time is obtained from two adjacent fields, Infantas and La Cira.

Field Development

Due to the comparative isolation and the particular nature of the country, many diverse operations having only incidental connection with the producing of oil but which cover a wide scope, must be continually carried on. An important one of these is that of road building. Approximately 500 kilometers of substantial roads have been constructed within the field.

The early wells in the field were drilled with cable tools and this system of drilling was used with more or less indifferent success during the first few years of development. The formations here consisting mostly of unconsolidated sands and shales do not favor the cable tool method. About 1925 rotary rigs were introduced in the field and rapidly proved their superiority over cable tools. For the past 10 years rotaries have been used exclusively.

Steam driven rigs are used as there is an abundant supply of natural gas available for fuel. Practically all of the footage drilled is made with drag bits, either the two-way or four-way type. Drawworks units which were purchased prior to the unitization scheme adopted by manufacturers in the north have been unitized in the local shops.

The casing program has been varied from time to time although the general trend has been toward the use of smaller diameter pipe. At the present time the general practice, after cementing 13⅜-inch surface pipe, is to carry an open hole to the top of the producing sand where either an 8⅝-inch or 6⅝-inch oil string is set and cemented. In completion a 5¾-inch or 4½-inch slotted liner is set opposite the producing section. In some cases, however, a 6⅝-inch combination string is run to bottom and cemented through perforations just above the producing sand.

Gun-perforating has been used during the past year or two to a considerable advantage. This method is generally employed on old wells in which the upper sands had been cased off when the wells were originally completed in the deeper zones. Where pressure maintenance is being carried on in the lower zone the latter is plugged off prior to perforating, but where this condition is not a factor the two zones are produced simultaneously. To some extent old liners have been gun-perforated with a resulting increase in production.

Oil production is obtained from two anticlinal structures in which the producing zones are all of Tertiary origin. Three distinct producing sands are present on the La Cira structure while at Infantas there are only two. These sands are designated as A. B. and C. in the order of depth with the C-zone being the most important.

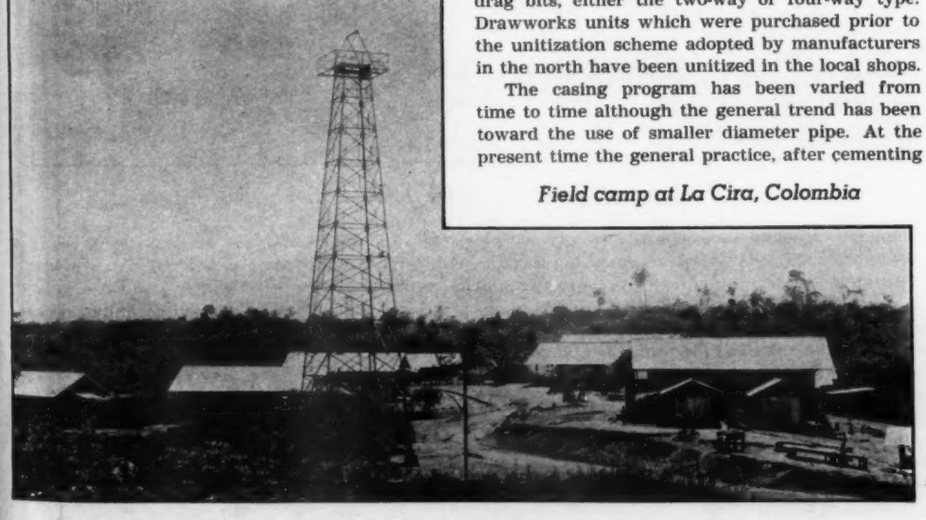
At La Cira near the crest of the structure the respective levels of the A. B. and C. zones are roughly 1,000, 1,500 and 2,000 feet. These sands gradually increase in depth toward the flanks of the structure and on the outer edge the C-zone is encountered at a depth around 4,000 feet. On the Infantas anticline the levels of the B. and C. sands are somewhat shallower.

Producing Equipment and Methods

Well spacing in the field is somewhat varied depending on the particular zone characteristics, depth and pressure conditions. On the Infantas anticline which was developed in advance of repressuring or pressure maintenance operations the conventional 10-acre spacing prevails. Drilling at the C-zone at La Cira commenced with 8.56 acres per well on a triangular pattern but with the introduction of a pressure maintenance program about 1930 the spacing was altered to 17 acres per well. Spacing in the B-zone carried a somewhat higher well density although the pattern is not uniform as many of the older C-zone wells have been converted to the intermediate sand producers by means of gun-perforating. Development plans for the A-zone have not been definitely formulated although from the sand thickness and the characteristics of the crude it is probable that a spacing between five and ten acres will be used.

To date approximately 840 wells have been drilled on the Infantas and La Cira structures. As in Peru the three general methods of lifting, natural flow, gas lift and pumping are used with pumping predominating to the extent of about 80 per cent of the total production.

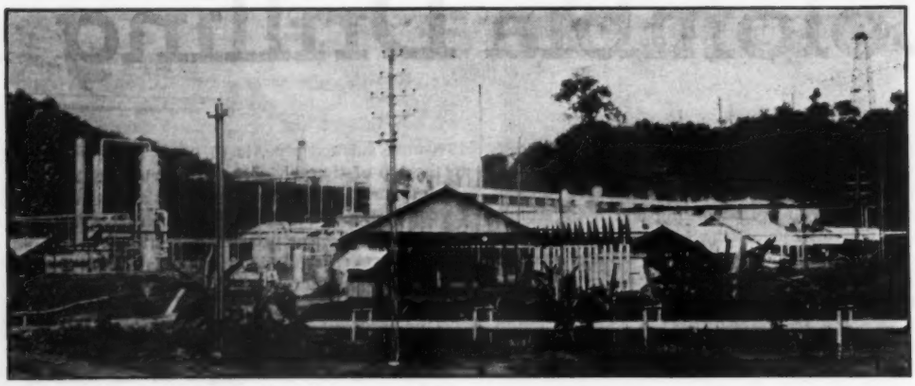
With the exception of two central pumping powers the wells are equipped with individual pumping units. The extremely broken terrain and the heavy undergrowth are not conducive to central power pumping. Due to the wide range in



Field camp at La Cira, Colombia

pumping conditions, units and pumping equipment of different types and capacities are carried in the field.

A distinctive feature is the extensive application of electric power for practically all plant and field operations outside of drilling. The generating plant of 8,000 K.W. capacity is located at El Centro and primary current distribution within a radius of three kilometers is at 2,300 volts while at greater distances 13,200 volts is used. Secondary current distribution throughout the field is at 440 volts from field transformer stations which are located so as to provide service areas of approximately one square kilometer per station. Capacities of these stations range from 50 K.V.A. to 225 K.V.A. (all three-phase) depending upon the number of wells and oil gathering stations located in the particular service area. While electrification has been carried out on a large scale the most important as well as the interesting application has been on well pumping equipment.



El Centro gasoline plant

When the first well pumping motors were obtained for the field the type of pumping equipment on hand was the "standard-front," an adaptation of the cable tool drilling rigs. As this equipment was used for both pumping and servicing dual rated motors of 15/35 horsepower were installed. Later as shallower wells were drilled and manufacturers improved their pumping unit design more compact and more efficient pumping equipment was installed. Also portable hoists for well servicing were placed in use.

As already stated, well servicing equipment is now all of the portable type and both electric and gasoline engine driven hoists are used. The latter are employed chiefly in clean-out work which is performed chiefly with hydrostatic bailers and perforation cleaners. The amount of clean-out work done is probably more than in most fields but here again it is believed that by keeping the wells as free as possible of loose sand the expense incurred will be more than offset by lower maintenance costs on pumping equipment.

Edge water is encountered on the lower flanks of both structures but up to the present time this condition is far less pronounced at La Cira where pressures are higher than on the Infantas anticline. Gathering stations are equipped with tanks and separators for handling wet oil and clean production separately.

All the emulsified oil is delivered to a central dehydration plant for treating. Both heat and chemical are applied in the treating process. The emulsion from the field is first received in a 55,000-barrel tank from which it gravitates through a battery of return tubular boilers used as oil heaters.

Gas conservation has been practiced by the Tropical Oil Co. since the beginning of producing operations on the concession. In the early life of the field reservoir energy was conserved by maintaining back pressure on all flowing wells. New wells were completed with tubing strings and packers which were set just above the producing zone.

The second stage in the conservation program was to further restrict the production of gas by shutting-in completely high gas-oil ratio or those wells situated on the crests of the structures. Later as the producing areas of the fields were extended reservoir pressures were augmented by gas injection. Gas return was started about 1930 and during the past five years a daily input to the producing sands of 25,000,000 cubic feet has been maintained.

Input pressures range from 300 to 800 pounds and input wells in the La Cira field are all situated on the structural "highs." This practice has been somewhat modified on the Infantas anticline due to peculiarities of structure, mainly transverse faulting. Due to sand and oil characteritics the C-zone formation lends itself best to repressuring. Considerable time and attention is devoted to gas-oil ratio control work. This branch of field operations, together with repressuring is supervised by an experienced petroleum engineering staff.

Natural Gasoline Plants

There are five natural gasoline plants operating in the field with an aggregate compressor capacity of 15,000 horsepower. Fifty-two units are used in low pressure service while twenty-three are high pressure units used in repressuring work.

Distillation of the mineral seal oil is carried out at the main or central plant and likewise stabilization of the raw product. At the El Centro plant there are two distillation units, one for taking care of the absorption oil at the local plant and the other from the four outlying plants. A portion of the finished natural gasoline is transported by means of a pipe line to the refinery at Barranca-Bermeja where it is blended with straight gasoline to supply market requirements within the country. The balance of the field product is mixed with the crude delivered to the Andian Pipe Line Company which transports the oil to tidewater for export.

Refining operations and shipment of refined products of the Tropical Oil Co. are carried on at the port of Barranca-Bermeja on the Magdalena River. Here also are delivered the necessary equipment and materials for field operations at El Centro. The Tropical has its own marine department which operates a fleet of river boats, but considerable freight for Barranca is also handled on outside boats.

The refinery consists of a modern plant for the manufacture of all classes of products required within the country which constitute mainly, gasoline both motor and aviation, kerosene, lubricating oils, gas and fuel oils, and asphalt. Within the past two years new Foster Wheeler units have been installed and placed in operation.

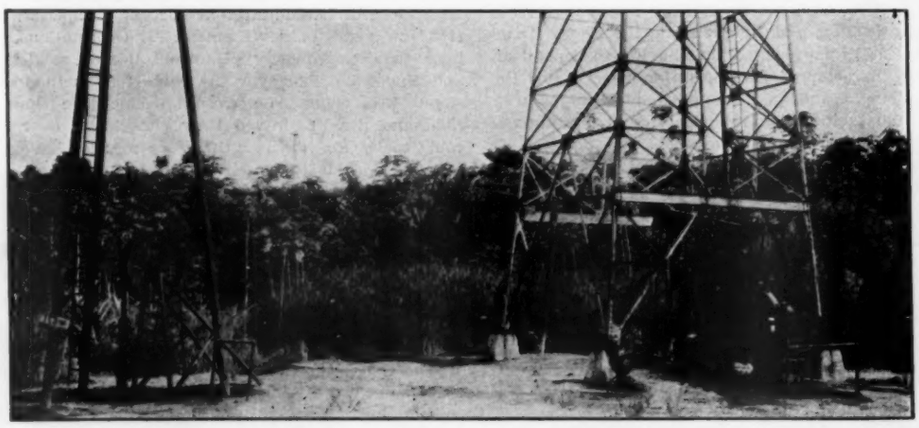
For lubricating oil manufacture low cold test B-zone crude is supplied from the La Cira field and processing consists of vacuum distillation supplemented with phenol treatment. The latter is also comparatively recent adjunct to the refining facilities.

General

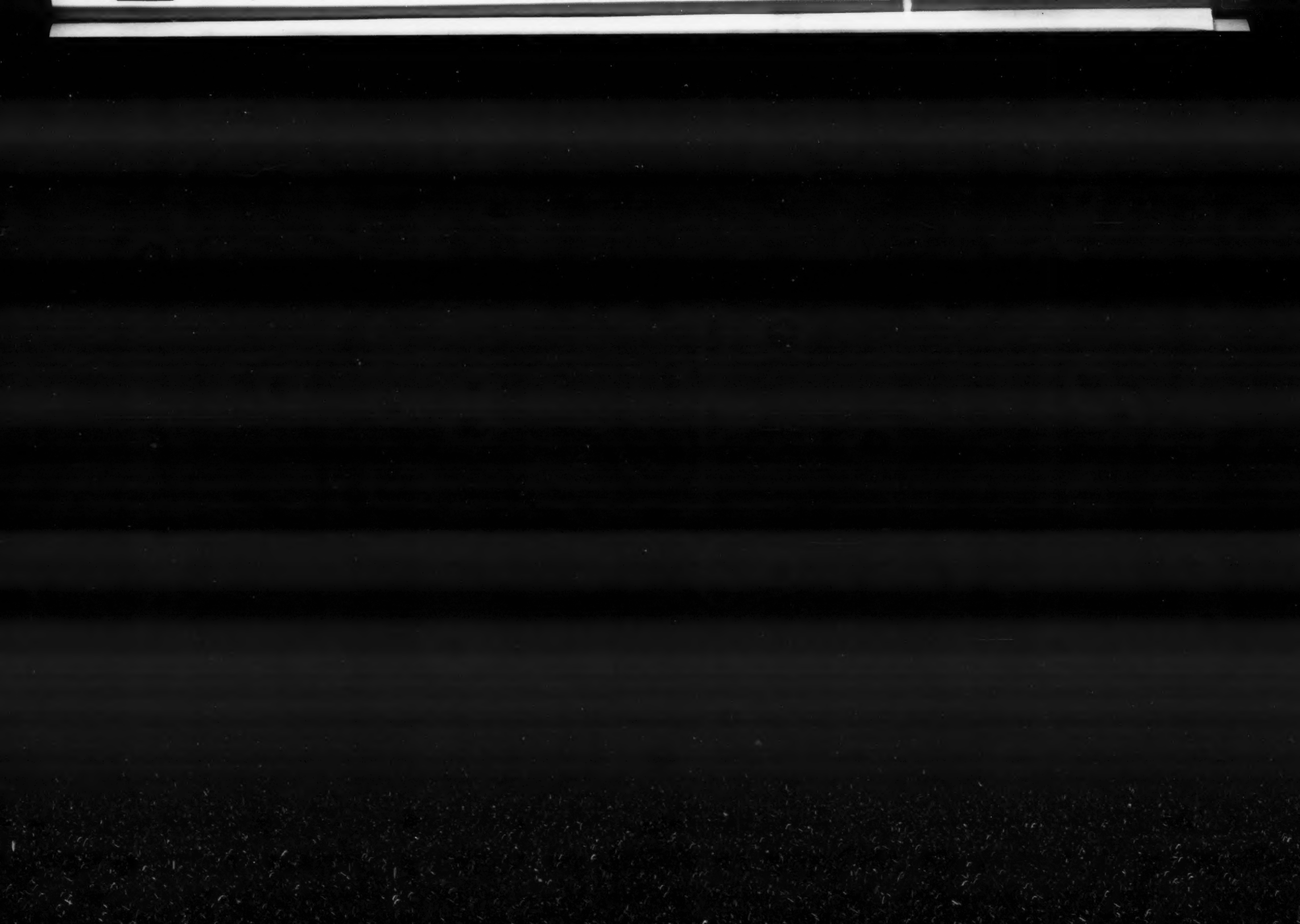
A notable achievement in which the company takes justifiable pride is its training and development of Colombian workmen. At the start of operations on the de Mares Concession the only available labor supply was an heterogeneous assortment of workers from various parts of the interior most of whom had no knowledge whatsoever of mechanical or oil field work. Consequently during the early years of development the company was obliged to fulfil its requirements of experienced and skilled men from the north. About ten years ago the company embarked on an active campaign of instruction and training of native labor which has resulted in producing many efficient and skilled workmen.

While it is true that this system demands greater supervision on the part of a highly competent staff it is believed that in the end this policy will best serve the mutual interests of the company and its employes. Advantages from the standpoint of the workmen have been better wages and a higher standard of living conditions. Besides paying the highest wages of comparable work within the country, the Tropical Oil Co. provides its employes with other benefits such as annual vacations, adequate housing under sanitary conditions, free medical and hospital service and various kinds of welfare along with recreational facilities.

Indirectly the company has benefited from its benevolent policies by having a comparatively low rate of turn-over in its organization while the average workman has become a more efficient and a more contented employe.



Twin well pumping in the Infantas field



PRODUCTS

PERFORMANCE

No. 1—Grappin circulant à déclenchement—Un outil de repêchage tous usages qui s'emploie avec succès pour repêcher tout objet pouvant se saisir au moyen d'une douille de type coulissant. American peut aussi fournir des grappins à double bol, ou peut convertir votre grappin, en un type à double bol, vous permettant ainsi d'avoir à tout moment un grappin prêt à repêcher un tuyau de forage ou un joint d'outil.

No. 2—Crampon de paroi et sabots fraiseurs, qui sont interchangeables avec le guide standard sur le grappin.

No. 3—Soupape de dégagement—Les ventes sans cesse croissantes dont cette soupape fait l'objet en prouvent le service supérieur et de tout repos. De construction simple, elle est robuste et à l'épreuve des fausses manoeuvres. Elle fonctionne parfaitement et coûte peu.

No. 4—Soupape et siège de pompe à boues—Permet d'avoir complètement raison des ennuis courants avec les soupapes et sièges ordinaires. De précision, mais avec un minimum de pièces subissant l'usure, d'où une plus longue durée d'emploi et un rendement satisfaisant.

No. 5—Lunette automatique — A cause de sa plus grande vitesse de fonctionnement, de sa sécurité pour le personnel, de l'efficacité de sa protection des machines et de sa durabilité, cette lunette a trouvé un accueil universel. A 4 points de prise et 2 points de dégagement. Ne compte que neuf pièces, dont seulement cinq sont des pièces mobiles.

No. 6—Tête Braden de type "C" — Elle est en acier coulé et prévue pour emploi dans les cas où il est nécessaire de suspendre le revêtement, et où on n'a pas besoin de tête du type coulissant. Elle est munie de garniture autour du revêtement et du collier, et prévoit un serre-garniture de presse-étoupe pour serrer le bourrage.

No. 7—Suspenseur de dévêtement de type "A" et pare-éclatement — Etudié pour *service extra-dur* avec une marge de sécurité amplement calculée, dépassant de beaucoup toute pression ou profondeur de puits connue à ce jour en forage. Il permet de faire descendre un revêtement à toute profondeur et de le suspendre au moyen de fourreaux sans devoir couper des raccords spéciaux. Eprouvé à 5.000 lbs. Garniture ignifuge spécialement adaptée.

No. 8—Support de tubage de type "D"—En acier de qualité supérieure et éprouvé à 3.000 lbs. Il a des fourreaux en trois pièces, de 6 pouces de long, fixés ensemble sauf en un point. Le corps présente une large ouverture permettant d'y faire passer un écouvillon ou un attrape-tubage.

No. 9—Raccord de tige aspiratrice et racleur de paraffine—Un outil de grande adaptabilité, qui en réunit trois en un seul, employé avec succès comme guide de tige aspiratrice, racleur de paraffine et égaliseur de charge. En acier traité thermiquement d'une seule pièce pour résister au plus dur usage.

No. 10—Harpon circulant à déclenchement—S'emploie avec succès dans le monde entier pour repêcher les fourreaux, revêtements, tuyaux de forage et tubage. Sa construction simple et robuste, et son dispositif de dégagement rapide et positif, assurent ensemble un rendement de tout repos qui économise temps et argent.

No. 11 — Purgeur conique — Un purgeur à trois gradins employé pour repêcher les joints d'outils, tuyaux de forage, bouts tordus de joints d'outils, ou tout autre objet à rattrapper de l'intérieur. Avec ce purgeur, on n'a plus besoin d'en employer trois tailles différentes. En acier spécial qui se tordra avant de se briser, et a une masse suffisante pour être redressé.

No. 12—Bras oscillant—Il aide les pompes à fonctionner avec plus de douceur et d'efficacité, il supprime le cognement et tout bruit inutile, et facilite le réglage des soupapes. A peu près toutes les pièces mobiles sont entièrement enfermées pour les mettre à l'abri des matières étrangères. Installation facile.

No. 1 — Agarrador circulante de disparo — Una herramienta de pescar, para todo uso, que se emplea con éxito para pescar todo objeto que pueda asirse o agarrarse con un casquillo de tipo corredizo. La American puede también suministrar agarradores de receptáculo doble, o bien, convertir su agarrador en un tipo de receptáculo doble, a fin de contar, en todo momento, con un agarrador listo para pescar un tubo de perforación o una herramienta de junta o unión.

No. 2—Gancho de pared y zapatas fresadoras, que son intercambiables con la guía corriente instalada en el agarrador.

No. 3—Válvula de desahogo—Las ventas crecientes y en grande escala de estas válvulas constituyen evidencia convincente de su sobresaliente y seguro servicio. Debido a su sencilla construcción, son muy durables y a prueba de manos inexpertas. Aseguran un funcionamiento perfecto, a bajo costo.

No. 4—Válvula y asiento de bomba de barro—Ofrecen la certeza de eliminar todas las molestias corrientes que se experimentan con las válvulas y asientos de construcción ordinaria. Precisas, pero con un número mínimo de piezas expuestas al desgaste, a fin de asegurar su prolongada duración y un funcionamiento satisfactorio.

No. 5—Carretel automático—A causa de su mayor velocidad de funcionamiento, seguridad para el personal, eficaz protección a la maquinaria y gran duración, este carretel automático ha tenido una aceptación universal. Tiene conexión de 4 puntos y desconexión de dos puntos. Está constituido por nueve piezas, de las cuales sólo sinco son de movimiento.

No. 6—Cabeza Braden de tipo "C" — Se hace de acero fundido y está especialmente proyectada para emplearse en los casos en que es necesario suspender el revestimiento, o cuando no hay necesidad de una cabeza de tipo corredizo. Está provista de empaquetadura alrededor del revestimiento y del collar, y va provista también de casquillo de prensaestopa para cerrar bien la empaquetadura.

No. 7—Suspensor de revestimiento de tipo "A" y evitador de explosión — Proyectado para servicio *muy pesado*, con un factor de seguridad ampliamente calculado, que sobrepasa mucho a toda presión o profundidad de pozo existente en la actualidad. Permite bajar el revestimiento a cualquier profundidad y suspenderlo mediante sujetadores, sin necesidad de cortar conexiones especiales. Ensayado a 5.000 libras. Empaquetadura contra incendio de proyecto especial.

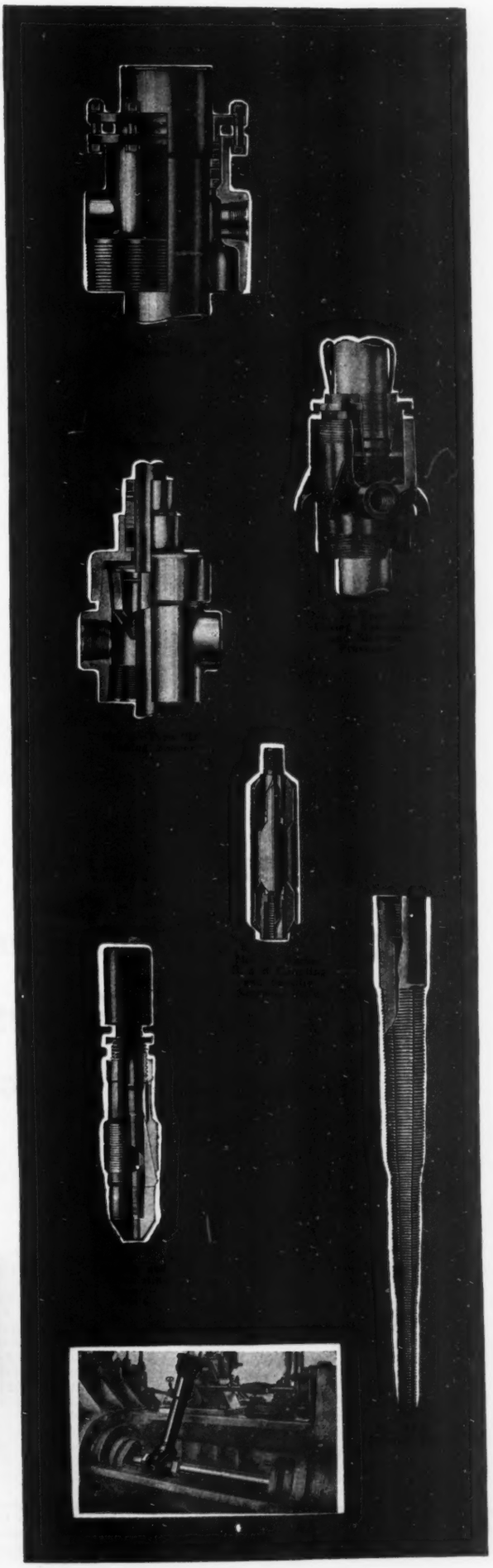
No. 8—Soporte de tubería de tipo "D"—De acero de muy fina calidad, ensayado a 3.000 libras. Tiene sujetadores de tres piezas, de 6 pulgadas de longitud, atados juntos con excepción de un solo punto. El cuerpo presenta una abertura grande, que permite el paso de un escobillón o de un atrapador de tubo.

No. 9—Acoplamiento de vástago de aspiración y raspador de parafina — Una herramienta de gran utilidad, que representa tres en una sola, que se emplea con éxito como guía de vástago de aspiración, raspador de parafina y compensador de carga.

No. 10—Arpón circulante de disparo — Se emplea con mucho éxito, en todo el mundo, para pescar forros, revestimientos, tubo de perforación y tubería. Su construcción sencilla y resistente y su dispositivo de disparo rápido y positivo, se combinan para formar una herramienta de excelente funcionamiento, que ahorra tiempo y dinero en el trabajo.

No. 11—Tapón cónico — Un eficaz tapón de tres pasos, que se emplea para la pesca de las uniones o juntas de herramientas, tubos de perforación, extremos torcidos de uniones de herramientas y todo otro objeto por atraparse en el interior. De acero especial, que se dobla antes de partirse, con una masa suficiente para permitir su fácil rehabilitación.

No. 12—Brazo oscilante—Permite que las bombas funcionen con mayor facilidad y eficacia. Suprime los golpes y ruidos innecesarios y facilita el ajuste de las válvulas. Casi todas las piezas de movimiento están encerradas, para protegerlas contra las substancias extrañas. Instalación fácil.



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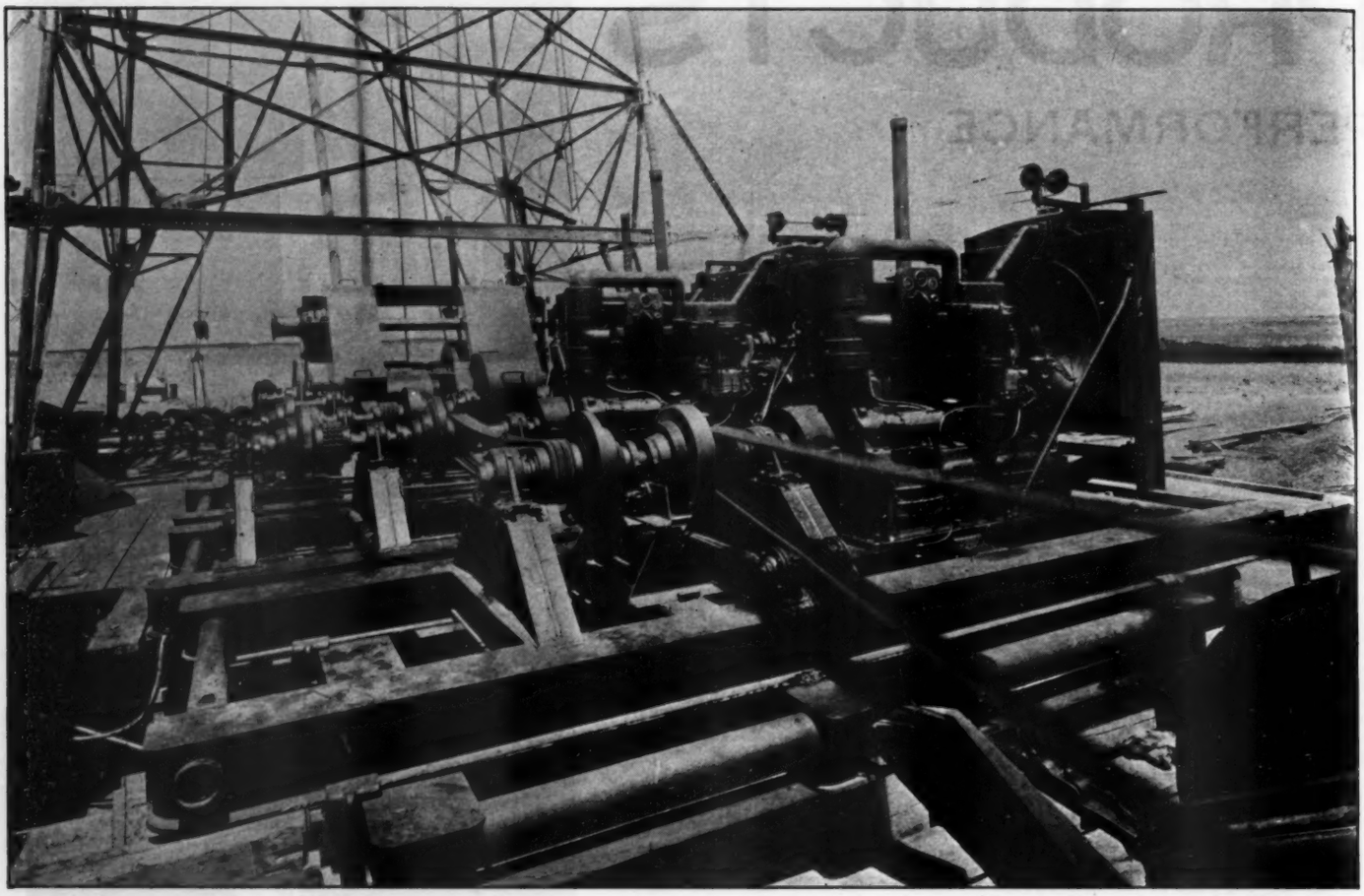


Modern Trends in Production Practice
Tendances Moderne en Production Practique
Nuevas Practicas en Produccion

PRESSURE DRILLING

With the ever increasing depth of wells and the correspondingly higher costs it has been necessary for drilling contractors and company engineers to devise means to hold the costs as low as possible. At the same time many new pieces of mechanical equipment have been developed for both drilling and production. Under proration few wells have had opportunity to make capacity flows for a protracted length of time and this, in some instances, has hindered the wells from properly cleaning themselves of drilling fluid.

One of the newer developments is pressure drilling. There are several variations of this practice. Some operators use gas-cut fresh water. Others prefer oil as the drilling fluid. In other instances it has been found desirable to use a high proportion of colloids in the mud. Each method has certain advantages. The drilling fluid is pumped down through the hollow drill pipe or by what is called "reversed circulation," that is, pumping the drilling fluid down the annular space between drill pipe and well-bore and permitting the cuttings to be returned through the space inside the drill pipe. This method has the advantage of creating lower

FORAGE SOUS PRESSION

Par suite de la profondeur sans cesse croissante des puits et des prix de revient plus élevés en résultant, les entrepreneurs de forage et les ingénieurs de compagnies ont dû s'ingénier à réduire ces frais le plus possible. En même temps on a réalisé de nombreux types nouveaux d'appareils mécaniques tant pour le forage que pour la production. Soumis à répartition très peu de puits ont eu la chance de donner un débit à plein rendement pendant un laps de temps prolongé, et ceci a empêché dans certains cas les puits de se nettoyer à fond du fluide de forage.

Un des progrès les plus récents est le forage sous pression. Il y a plusieurs variantes de ce procédé. Certains foreurs utilisent de l'eau douce contenant du gaz occlus. D'autres préfèrent de l'huile comme liquide de forage. Dans d'autres cas on a été amené à faire usage d'une forte proportion de colloïdes dans la boue. Chaque méthode a ses avantages. On refoule le liquide de forage à travers du tuyau de forage creux ou par ce qu'on appelle "circulation inversée," c'est-à-dire qu'on force par pompage le liquide de forage à descendre dans l'espace annulaire compris enter le tuyau de forage et les parois du puits et on permet aux débris de revenir par l'intérieur du tuyau de forage. Cette méthode a l'avantage de créer des pressions plus basses sur la formation par suite du fait que le courant remontant du fluide de forage à travers l'espace relativement plus réduit à l'intérieur de la

PERFORACION BAJO PRESION

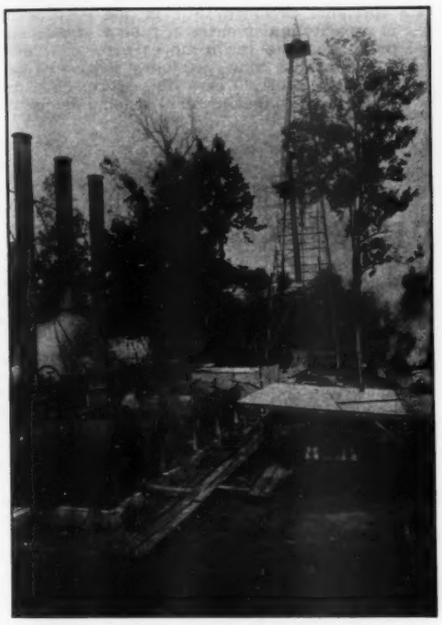
Debido a la creciente profundidad de los pozos y gastos de explotación correspondientemente más altos, los centratistas de perforación y los ingenieros de firmas explotadoras se han visto obligados a descubrir medios conducentes a mantener los gastos a la menor cifra posible. Al mismo tiempo, se han perfeccionado muchos nuevos equipos mecánicos para la perforación y producción. Debido a prorrateo, pocos pozos han tenido la oportunidad de fluir a capacidad durante un prolongado período de tiempo, y ésto, en algunos casos, ha impedido que los pozos se limpien debidamente del líquido de perforación.

Uno de los más recientes desarrolos es la perforación bajo presión. Esta práctica presenta ciertas variaciones. Algunos perforadores usan agua fresca con mezcla de gas. Otros prefieren el petróleo, como líquido de perforación. En otros casos se ha visto conveniente el empleo de una buena proporción de coloides en el barro. Cada método tiene sus ventajas. El líquido de perforación es introducido por bomba en el tubo de perforación hueco, o por lo que se llama "circulación invertida," es decir, introduciendo el líquido de perforación por el espacio circular entre el tubo de perforación y diámetro del pozo, para permitir que las partículas sólidas regresen por el espacio dentro del tubo de perforación. Este método tiene la

pressures against the formation because the upward flow of drilling fluid through the relatively smaller space inside the drill stem increases its velocity so that its carrying capacity for cuttings is greater and this aids in the drilling and well completion.

The use of oil for drilling fluid is not new. In some instances a special oil has been prepared by the refinery, an oil that will not gas-cut easily and still has properties for carrying cuttings from the bottom of the hole. If some of the oil enters the formation it is easily identified when the well is put on production.

The use of highly colloidal mud has gained favor in many areas because it will not penetrate the pore spaces in the producing formation and can be removed from the hole easily. Oil has been used in some instances for mixing this colloidal type of mud and this practice may have wider applica-



Battery of high-pressure boilers for rotary drilling outfit

Batterie de chaudieres de haute pression pour appareillage de forage rotatif

Grupo de calderas de alta presion por el equipo de perforacion rotativa

tion in the future. Another advantage gained in using colloidial mud has been the ability to obtain better samples of cuttings and cores. As this kind of mud does not enter the pores in the sand the cores are better samples of the section penetrated.

Another variation of this practice of using colloids in drilling fluid is adding specially prepared limestone, which acts as a filler in the mud but can be removed later by the use of hydrochloric acid and in this way break down the mud sheath which may have been deposited across the face of the producing formation. If some of this lime-impregnated mud should enter into the more permeable portions of the producing formation, the acid will destroy the grains of limestone and permit the mud to be washed out of the pores by the flow of gas and oil from the formation.

Reversed circulation has been used more generally recently because the equipment needed to apply this system of drilling is simple and portable. It is not necessary to build up high surface pressures if the reversed circulation method is used, and this in turn reduces the power requirements. Cuttings are delivered to the surface at higher velocities and are therefore available more quickly to the geologist watching the well. There is no

tige de forage est plus rapide, ce qui fait que sa capacité de transport de débris est plus grande et partant le forage et l'achèvement du puits plus faciles.

L'emploi de l'huile comme liquide de forage n'est pas une nouveauté. Dans certains cas la raffinerie prépare à cette fin une huile spéciale qui tout en ne retenant pas facilement du gaz occlus a le pouvoir d'entraîner les débris depuis le fond du puits. Si un peu de cette huile vient à pénétrer la formation, il est facile de la repérer quand on met le puits en production.

L'emploi de boue fortement colloïdale a gagné en faveur en bien des endroits car elle a la vertu de ne pas pénétrer dans les pores de la formation et peut facilement s'extraire du puits. Dans certains cas on a employé de l'huile en mélange avec ce type colloïdal de boue et cette pratique peut fort bien se répandre à l'avenir. Un autre avantage résultant de l'emploi de boue colloïdale a été la faculté d'obtenir de meilleurs échantillons de débris et de carottes. Etant donné que ce type de boue ne pénètre pas les pores du sable, les carottes donnent de meilleurs échantillons de la section pénétrée.

Une autre variante de cette pratique de l'emploi des colloïdes dans le liquide de forage consiste à ajouter un calcaire spécialement préparé qui bouche les pores de la boue et peut être éliminé par la suite au moyen d'acide chlorhydrique, et on désagrège ainsi la gaîne de boue qui a pu se déposer en travers de la surface de la formation en production. Si un peu de cette boue imprégnée de chaux venait à pénétrer dans les parties plus perméables de la formation en production, l'acide détruirait les grains de calcaire et permettrait à la boue d'être libérée des pores et entraînée par le courant de gaz et de pétrole qui jaillit de la formation.

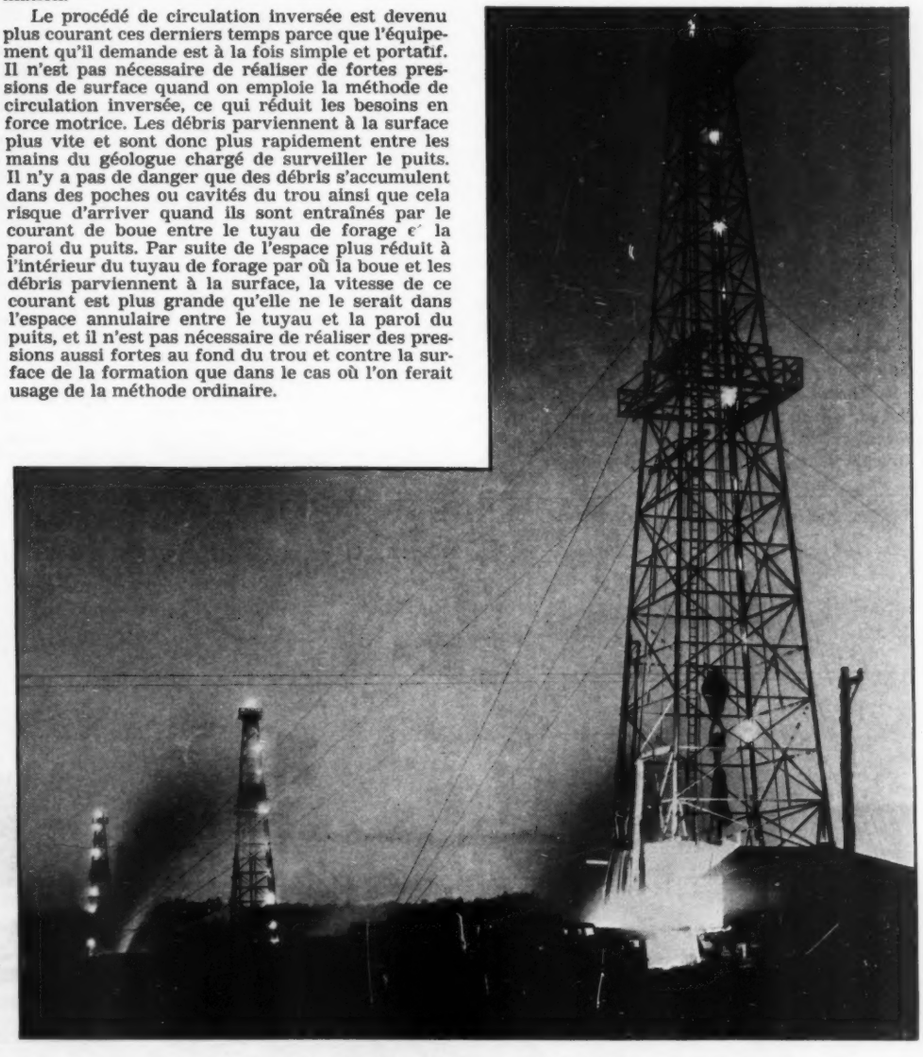
Le procédé de circulation inversée est devenu plus courant ces derniers temps parce que l'équipement qu'il demande est à la fois simple et portatif. Il n'est pas nécessaire de réaliser de fortes pressions de surface quand on emploie la méthode de circulation inversée, ce qui réduit les besoins en force motrice. Les débris parviennent à la surface plus vite et sont donc plus rapidement entre les mains du géologue chargé de surveiller le puits. Il n'y a pas de danger que des débris s'accumulent dans des poches ou cavités du trou ainsi que cela risque d'arriver quand ils sont entraînés par le courant de boue entre le tuyau de forage et la paroi du puits. Par suite de l'espace plus réduit à l'intérieur du tuyau de forage par où la boue et les débris parviennent à la surface, la vitesse de ce courant est plus grande qu'elle ne le serait dans l'espace annulaire entre le tuyau et la paroi du puits, et il n'est pas nécessaire de réaliser des pressions aussi fortes au fond du trou et contre la surface de la formation que dans le cas où l'on ferait usage de la méthode ordinaire.

ventaja de producir menores presiones contra la formación, debido a que la corriente ascendente de líquido de perforación, por el espacio relativamente menor, dentro del vástago del taladro, adquiere mayor velocidad, desarrollando también mayor capacidad para el acarreo de partículas sólidas, lo que es una ayuda a la perforación y terminación del pozo.

El empleo de petróleo, como líquido de perforación, no es cosa nueva. En algunos casos, la refinería prepara un petróleo especial, que no puede mezclarse fácilmente con el gas y que tiene todavía propiedades para acarrear las partículas sólidas desde el fondo del agujero. Cuando parte del petróleo se introduce en la formación, su presencia puede ser identificada fácilmente cuando el pozo se pone en producción.

El empleo de barro con gran proporción de coloidales se ha hecho de muchos adeptos, en muchas partes, a causa de que semejante líquido no puede introducirse en las secciones porosas del yacimiento productivo y por otra parte, puede fácilmente retirarse del agujero. En algunos casos se ha empleado petróleo mezclado con este tipo de barro coloidal, y esta práctica seguramente se difundirá más en lo futuro. Otra ventaja derivada del empleo de barro coloidal es que permite obtener mejores muestras de roca y de partículas sólidas. Como esta clase de barro no penetra en los poros de la arena, resultan mucho mejores las muestras sacadas de la sección perforada.

Otra variación de esta práctica de emplear coloidales en el líquido de perforación es la adición de piedra caliza especialmente preparada, la cual sirve de relleno en el barro, pudiendo después quitarse mediante ácido hidroclórico. De este modo se separa la capa de barro que pudiera haberse depositado sobre la cara de la formación produc-



Tall derricks illuminated for night drilling operations

Hautes tours de sondage eclairees pour travaux de forage de nuit

Altas torres iluminadas para trabajos nocturnos de perforacion

possibility of cuttings accumulating in pockets or caved portions of the hole as they can do if carried by the mud stream flowing between drill pipe and well bore. With the smaller space inside the drill pipe used to convey the mud and cuttings to the surface the volocity of this stream is higher than it would be in the annular space between pipe and well bore, and it is not necessary to build up as high pressures at the bottom of the hole and against the face of the formation as would be demanded if regular circulation were used.

CONTROLLED DIRECTIONAL DRILLING

Crooked holes made unintentionally were common during the early period of developing high-powered rotary equipment. That tendency to deflect from the vertical was corrected so that it is now possible to drill holes more than 6,000 feet deep and have less than 5 degree deflection from the vertical. Ability to control the path to be followed by the drill has led to the development of controlled deflected-hole drilling. This method of drilling has application in many fields where unusual conditions make it necessary to complete the bottom of the hole at some point not directly under the derrick floor. In salt-dome fields oil sometimes is found under the overhanging upper section of the salt dome and it can be reached best by deflecting the hole to penetrate the producing section of the formation in an oblique path. Along the Pacific Ocean in California many bodies of oil lie under tidewater land adjacent to the shore and can be reached best by starting the holes on the shore and deflecting them oceanward so the producing formations are penetrated at some point opposite the derrick built on the shore. These deflections may be as high as 62 degrees from the vertical, but many wells have been completed successfully under these conditions, and at all times the drilling operations have been under complete control of the operator.

Whipstocks and knuckle-joints are used to deflect the drill. The whipstock is a bar of steel which is beveled. It can be placed in the bottom of the hole in such a position that the beveled side will push the bit away from the normal vertical path and cause it to drill in a direction predetermined as necessary to reach the desired objective. The knuckle-joint is a steel drilling tool hinged in such

FORAGE DIRECTIONNEL CONTROLE

Au début de la période d'emploi du matériel rotatif de haute puissance il était fréquent d'obtenir des trous de forage déformés sans le vouloir Cette tendance à s'écarter de la verticale a été corrigée de sorte qu'il est maintenant possible de forer des trous à plus de 6.000 pieds de profondeur tout en ne déviant pas plus de 5 degrés par rapport à la verticale. La faculté de contrôler la direction que doit suivre le foret a conduit au perfectionnement du forage contrôle de trous déviés. Ce mode de forage trouve son application dans de nombreux chantiers où des conditions spéciales obligent à achever le fond du puits à un point non exactement en-dessous du plancher de la tour de sondage. Dans les champs à dôme salin, on trouve parfois du pétrole sous la section supérieure surplombante du dôme salin, et on ne peut pas y parvenir mieux qu'en faisant dévier le trou de façon à pénétrer la section productrice de la formation par une voie oblique. Le long de l'Océan Pacifique en Californie de nombreuses nappes de pétrole gisent sous du terrain lavé par les marées adjacent à la côte, et le meilleur moyen d'y parvenir est de commencer des trous sur la côte, puis de les faire dévier dans la direction de l'océan afin de pénétrer les gisements producteurs à un point vis-à-vis de la tour de sondage élevée sur la côte. Ces déviations peuvent aller jusqu'à 62 degrés par rapport à la verticale, mais de nombreux puits ont été forés avec succès dans ces conditions, et les opérations de forage n'ont pas cessé d'être sous le parfait contrôle de l'opérateur.

Des biseaux de déviation et des joints articulés sont utilisés pour faire dévier le foret. Le biseau de déviation est une barre d'acier à chanfrein. On peut le placer au fond du trou dans une position telle que le côté biseauté écarte le trépan de la ligne verticale normale et l'amène à forer dans une direction fixée à l'avance pour arriver à l'objectif visé. Le joint articulé est un outil de forage en acier dont l'articulation est telle qu'elle permette de faire dévier le foret par rapport à la verticale quand on le fixe à l'extrémité inférieure de l'outil. On peut aussi avec cet outil régler l'angle de déviation.

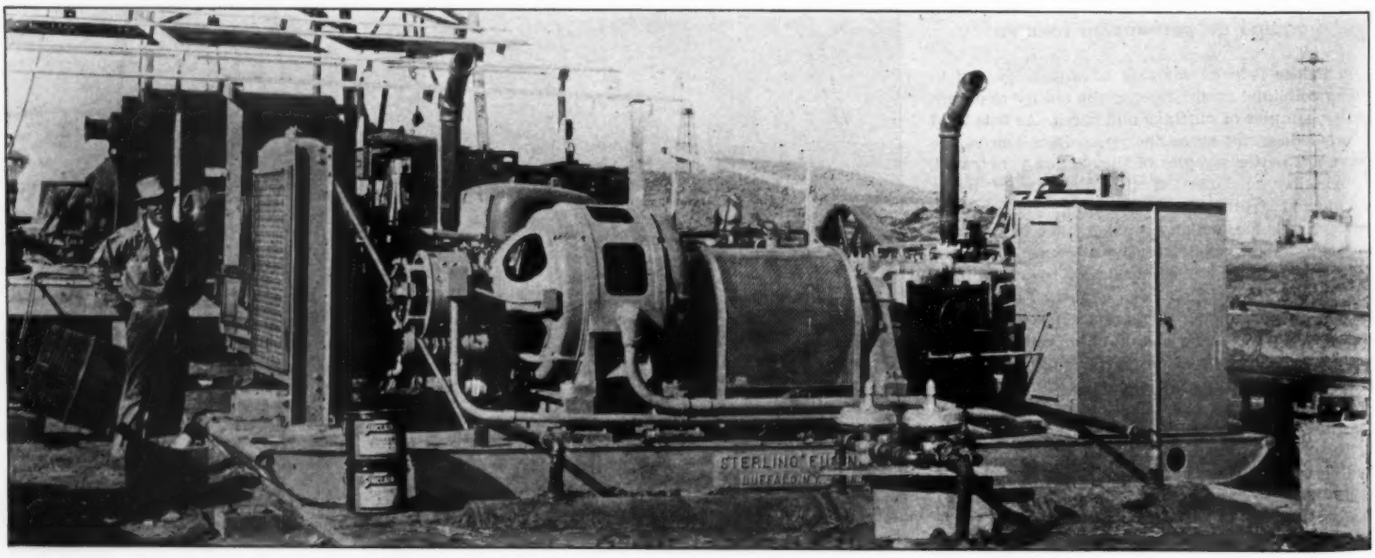
Dans le forage de trous déviés il est nécessaire de surveiller à de fréquents intervalles la direction suivie par le trépan, ce qui est fait au moyen de plusieurs instruments qu'on trouve dans le commerce. La déviation et la direction sont enregistrées par ces instruments de telle manière que le foreur peut dire exactement où se trouve le tuyau de foret après que les données obtenues par la prospection ont été portées sur graphique. Grâce à cette méthode de forage contrôlé on est arrivé à achever le puits à un nombre relativement faible de pieds de l'emplacement souterrain visé, et dans certains cas le fond du trou se trouvait pourtant à plus de 3.000 pieds du centre du plancher de tour de sondage en direction horizontale.

tiva. En caso de que parte de este barro calcáreo penetre en la sección más permeable de la formación productiva, el ácido destruirá los granos de piedra caliza y permitirá que el barro salga de los poros bajo la influencia de la corriente de gas y de petróleo de la formación.

La circulación invertida ha sido recientemente utilizada de un modo más general, a causa de que el equipo que se requiere para la aplicación de este procedimiento de perforación es sencillo y portátil. Cuando se sigue el método de circulación invertida, no hay necesidad de desarrollar grandes presiones superficiales, lo que por su parte reduce los requisitos de fuerza. Las partículas sólidas suben a la superficie con mayor rapidez y quedan así más prontamente a la disposición de los geólogos que estudian el pozo. No se presenta la posibilidad de que las partículas sólidas se acumulen en nichos o en partes derrumbadas o ahuecadas del agujero, como suele suceder cuando son acarreadas por la corriente de barro que pasa entre el tubo de perforación y el diámetro del pozo. Debido al menor espacio dentro del tubo de perforación empleado para conducir el barro y las partículas sólidas a la superficie, la velocidad de esta corriente es mayor que la que se presenta par el espacio anular entre el tubo y el diámetro del pozo. Por esta razón, no es necesario desarrollar las mismas altas presiones sobre el fondo del agujero y sobre la cara de la formación, que se requieren en conexión con el sistema de circulación ordinario.

PERFORACION DIRECCIONAL DIRIGIDA

Al comienzo del empleo del moderno equipo rotativo de alta potencia, con frecuencia se obtenían involuntariamente agujeros desviados. Esta tendencia a apartarse de la vertical ha sido corregida, de suerte que es ahora posible perforar agujeros de más de 6.000 pies de profundida sin una desviación de más de 5 grados de la vertical. La facultad de poder dirigir la dirección que debe seguir la sonda, ha conducido al perfeccionamiento de la perforación dirigida o controlada de agujeros desviados. Este método de perforación se aplica ahora en numerosos campos, cuyas especiales condiciones locales obligan a terminar el fonda de los pozos en un punto no exactamente debajo de la torre de perforación. En los campos de estructura inclinada, el petróleo se halla, a veces, debajo de la sección superior sobresaliente horizontalmente por encima del techo o bóveda de sal, y la mejor manera de alcanzarlo es desviando el agujero, para penetrar la sección productiva del yacimiento en una dirección oblícua. En la costa del Pacífico, de California, muchas capas de petróleo se hallan debajo del terreno lavado por las mareas adyacentes a la costa, y la mejor manera de de tener acceso a ellas es comenzando los agujeros en la costa y luego desviándolos en la dirección



Internal combustion engine electric generator power plant for rotary rig
Groupe de pompage actionne par moteur a combustion interne
Grupo de bomba provisto de motor de combustion interna

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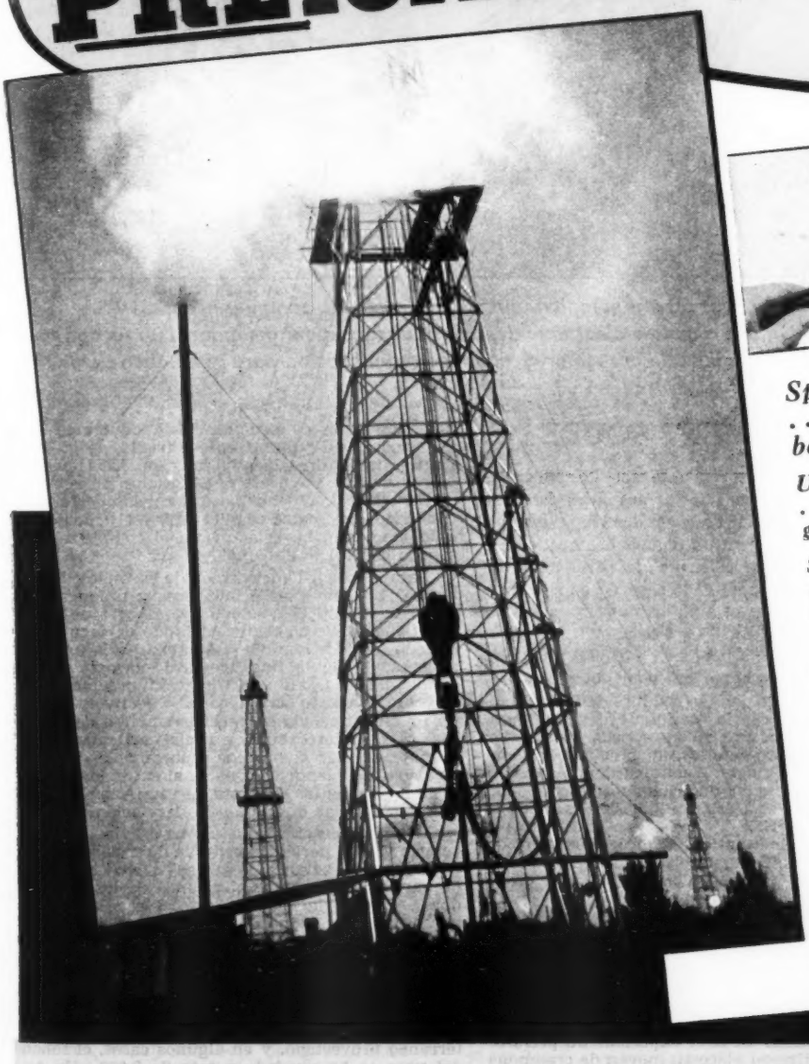
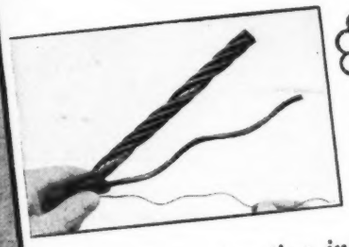
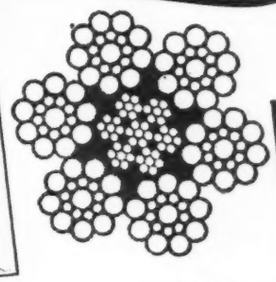
PREformed Wire Lines







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Gante 11
Mexico, D. F.

Federico A. Kubli
Reconquista 165
Buenos Aires, Argentina

For the punishing requirements of rotary drilling, Macwhyte recommends Monarch Whyte Strand *PRE*formed Rotary Line.

This special line is made of tough wire which gives great resistance to fatigue and abrasion.

Every wire and strand in this line is *PRE*formed. The result is a minimum of internal stress and friction which allows the line to bend easily over sheaves and wind evenly on drums.

Macwhyte manufactures many specially designed wire lines for the oil fields—including cable tool lines, swabbing lines, casing lines, tow lines, tubing lines, winch ropes, sucker rod lines, fall lines.

Distributors throughout the U. S. oil fields. Warehouse at Texas and Pacific Terminal Building, Fort Worth, Texas.

Pour répondre aux conditions sévères du travail au "Rotary" Macwhyte recommande son câble spécial "Monarch Whyte Strand *PRE*formed Rotary line".

Ce câble est composé de fils offrant une très grande résistance à la fatigue et à la corrosion.

Chaque fil de ce câble est préalablement mis en forme. Il en résulte un minimum de tensions et de frictions intérieures, ce qui permet au câble de se plier aisément sur les poulies à gorges et de s'enrouler régulièrement sur les tambours.

Macwhyte fabrique toute une variété de câbles, spécialement étudiés pour répondre aux différents besoins de l'industrie du pétrole.

Ecrire à Macwhyte Company, Kenosha, Wisconsin, U. S. A. pour obtenir le nom de l'Agent le plus proche qui pourra vous fournir tous renseignements utiles.

Para los árduos requisito de perforación al sistema rotatorio, Macwhite recomienda los cables Monarch Whyte Strand *PRE*formed.

Estos cables de construcción especial están fabricados con un alambre fortísimo que hace difícil el romperse con el torcimiento y la fricción.

A cada alambre y cordón de este cable se le ha dado la forma sin torcer. Este procedimiento ha dado por resultado una resistencia interna máxima que permite doblar fácilmente el cable sobre las poleas y facilita una envoltura uniforme en los tambores.

Macwhyte especializa en la construcción especial de una variedad de cables, entre los que pueden citarse aquéllos para rehabilitación de pozos, para tubería de perforación, para remolques, para instalación de tubos, para grúas, y para varillas de bomba.

Para informes sobre las agencias más cercanas, diríjase a The Macwhyte Company, Kenosha, Wisconsin, E. U. A.

MACWHYTE COMPANY, KENOSHA, WIS., U. S. A.

a manner as to permit the drill to be deflected from the vertical when it is attached to the lower end of the tool. The angle of deflection is controllable with this device also.

In drilling deflected holes it is necessary to survey the path being followed by the bit at frequent intervals and this is done by the use of several instruments now on the market. The deflection and direction are recorded by these instruments so the driller can tell exactly where the drillpipe is located after the data obtained by the survey has been plotted. It has been possible by the use of this controlled drilling method to complete the hole within a relatively few feet of the desired underground location and in some instances the bottom of the hole has been more than 3,000 feet away from the center of the derrick floor in a horizontal direction.

WELDED CASING

It has been rather common practice to weld strings of surface or large-size casing as it is run into the hole, but until recently the welding of long strings of smaller-diameter casing as run has not been practiced. Several strings of 8¼- 7- and 6⅝-inch pipe have been welded and run successfully and there appears to be a tendency to carry this work further.

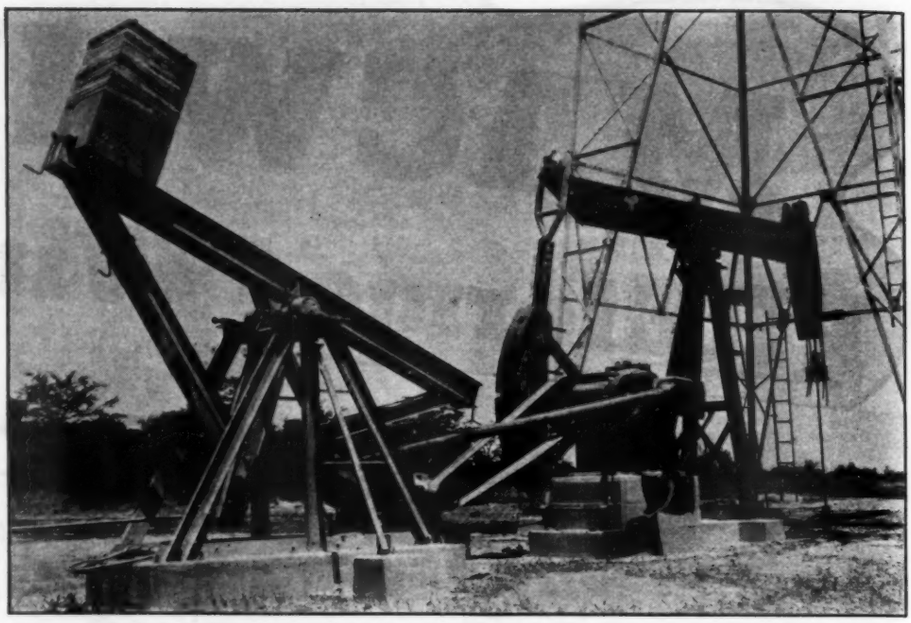
The most important detail in gaining proper results in welding long strings of pipe is the technique of the welders. To make such welds, which cannot be tested afterward, it is necessary to train the welders thoroughly. This training is given in a welding shop where sections of pipe are welded. Coupons are taken from these welded sections and

Welded slip joint on 13⅜" casing
Joint coulissant soude sur revetement de 13⅜ pouces
Junta movediza soldada en un revestimiento de 13⅜"

tested. When the welder has attained a proficiency that insures good welds consistently, he is ready to go on the derrick floor and carry on this work in actual running of long strings of pipe.

To facilitate handling and speed up the operations one or two ratholes are drilled close to the well. One joint of pipe, usually 40 feet long, is lowered into the rathole so that the upper end extends about shoulder high above the derrick floor. A

(Continued on Page 157)



Electric motor driven pumping unit with take-off for pumping second well
Groupe de pompage a moteur electrique avec prise de force pour pompage d'un second puits
Grupo de bomba accionado por motor electrico con remificacion para el bombeo de un segundo pozo

REVETEMENT SOUDE

Une pratique assez courante a été de souder des colonnes de revêtement de surface ou de fort calibre au moment de leur descente dans le puits, mais jusque tout récemment on n'avait pas pratiqué le soudage de longues colonnes de revêtement de petit calibre au moment de la pose. Or on a maintenant réussi à souder et à poser plusieurs colonnes de tuyau de 8¼ - 7 - et 6⅝ pouces, et il semble y avoir une tendance à pousser ce travail plus loin.

Le détail le plus important pour obtenir des résultats satisfaisants dans la soudure de longues colonnes de tuyau est la technique des soudeurs. Pour faire ces soudures qu'on ne peut pas vérifier par la suite, il est nécessaire d'entraîner des soudeurs à fond. Cet entraînement est donné dans un atelier de soudure où on soude des sections de tuyau. On prend des échantillons de ces sections soudées qu'on vérifie. Quand le soudeur a acquis l'habileté lui permettant de faire régulièrement de bonnes soudures, il est prêt à se rendre à la tour de sondage et à faire ce travail dans la pose effective de longues colonnes de tuyau.

Pour faciliter la manutention et activer les opérations, on fore un ou deux trous de rat tout prêt du puits. On descend dans le trou de rat un joint de tuyau, en général de 40 pieds de long, de manière à ce que le bout supérieur dépasse à peu près à hauteur d'épaule le plancher de tour de sondage. On fait alors descendre un deuxième joint de tuyau au-dessus du bout supérieur du premier joint et on le fixe en place au moyen de crampons prévus spécialement pour cet emploi. Les soudeurs soudent alors ces deux joints de tuyau ensemble et cette section double est hissée dans la tour de sondage et descendue par au-dessus de la section supérieure de la colonne de revêtement déjà dans le puits. Ce tuyau s'aligne et se met en place aussi au moyen de crampons spéciaux et les soudeurs achèvent l'opération. On prépare ce tuyau à l'usine en vue de cet emploi, en général en taillant une rainure arrondie dans les bouts de tuyau de manière que deux rainures une fois conjuguées forment une section demi-ronde, avec le plat assez épais pour offrir une ample surface au soudage. On remplit les rainures de métal de soudure et on le laisse dépasser la surface normale du tuyau. Ces soudures se sont montrées d'une résistance égale à celle du tuyau et peuvent se faire très vite.

Une variante de cette pratique est d'employer le revêtement à joint coulissant qu'on réalise en matant un des bouts du joint de manière que le bout normal s'adapte serré dans le bout évasé et offre la surface nécessaire pour souder les deux joints ensemble de la manière habituelle.

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REVESTIMIENTO SOLDADO

Una práctica muy corriente ha sido la de soldar las columnas o series de revestimientos de superficie o de gran calibre al momento de su introducción en el pozo, pero la soldadura de largas series de revestimiento de pequeño diámetro, al momento de su descenso en al pozo, es cosa muy reciente. Se ha logrado ya soldar e instalar varias series de tubos de 8¼ x 7 y 6⅝" y parece que existe tendencia hacia un mayor desarrollo de esta práctica.

El detalle más importante para obtener resultados satisfactorios en la soldadura de largas series de tubos es la misma técnica de los soldadores. Para hacer estas soldaduras, que no peuden verificarse después de la instalación, es menester entre-

(Continué en Página 157)

del mar, a fin de penetrar los yacimientos productivos en un punto, frente a frente, de la torre de perforación instalada en la costa. Estas desviaciones pueden ser hasta de 62 grados, en relación con la vertical. Muchos pozos han sido perforados con éxito, bajo estas condiciones, y el trabajo, en todo momento, ha estado bajo el completo gobierno o control de los explotadores.

Para producir la desviación de la sonda o barrena, se eblean útiles desviadores y uniones articuladas. El útil desviador es una barra de acero achaflanada. Se coloca en al fondo del agujero y su lado biselado empuja la barrena hacia un lado, apartándola de la línea vertical normal y haciéndola perforar en una dirección predeterminada como necesario para llegar al objectivo en vista. La unión articulada es una herramienta de perforación, de acero, cuya especial articulación le permite desviar la barrena, apartándola de la línea vertical, cuando se conecta al extremo inferior de la herramienta. Con esta herramienta se puede también regular el ángulo de desviación.

En la perforación de agujeros desviados es necesario vigilar periódicamente la dirección seguida por la sonda o barrena, lo que se hace con la ayuda de varios instrumentos al alcance de los explotadores. La desviación y la dirección se registran por estos instrumentos de modo que el perforador puede decir exactamente donde va el tubo de perforación, después de los datos del trabajo se han trazado en forma gráfica. Gracias a este método de perforación dirigida o controlada, se ha llegado a terminar pozos dentro de un número comparativamente pequeño de piés del punto subterráneo proyectado, y en algunos casos, el fondo del pozo se ha quedado a más de 3.000 piés del centro de la plataforma de la torre de perforación en dirección vertical.

Core and sample rack — *Ratelier de carottes et echantillons* — *Soporte de muestras*

second joint of pipe then is lowered over the upper end of the first joint and held in place by clamps especially made for this purpose. The welders then weld these two joints of pipe together and the double section is hoisted into the derrick and lowered over the top section of the string of casing already in the well. This pipe is also aligned and held in place by special clamps and the welders complete the operation. The pipe is prepared at the factory for this kind of use, usually by cutting a rounded groove in the pipe ends so that two grooves when matched form a half-round section, with the land thick enough to offer ample surface for welding. The welding metal is filled into the grooves and allowed to build up above the normal surface of the pipe. Such welds have proven to be as strong as the pipe and can be made quickly.

A variation of this practice is to use slip-joint casing, made by upsetting one end of the joint so that the plain end will fit snuggly into the belled end and provide surface for welding the two joints together in the usual manner.

CORE BARRELS

As more and more attention is being given to the taking of samples of cuttings and obtaining representative cores of various formations, much thought has been devoted to developing a better technique. Improved core-barrels are available with nonrotating inner barrels and modified core-retaining mechanisms. Using collodial muds or drilling with oil has enabled the drillers to get first-class cores, which are now being examined in laboratories to determine many characteristics of the formations.

LABORATORY WORK ON CORES

The geologist for a number of years has used cores for correlation and structure study and this practice has increased as the drilling became deeper, with corresponding rise in costs. Although the microscope, in a qualitative way, revealed much important information relative to the physical nature of the formation, the exploration departments recognized the need for actual measurements of such properties as permeability and porosity. Thus, 1937 finds the industry making

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TUBE CAROTTIERS

Comme on attache une importance de plus en plus grande au prélèvement d'échantillons de débris et à l'obtention de carottes représentatives des diverses formations, on s'est appliqué à mettre au point une technique plus perfectionnée. Il existe maintenant des tubes carottiers avec tubes intérieurs non tournants et des mécanismes nouveaux de prélèvement de carotte. L'emploi des boues colloïdales ou de l'huile en forage a permis aux foreurs d'obtenir des carottes de premier ordre qu'on soumet alors à l'examen dans des laboratoires pour déterminer les nombreuses caractéristiques des formations.

ETUDE DES CAROTTES AU LABORATOIRE

Depuis bon nombre d'années le géologue se base sur l'examen de carottes en prospection de corrélation et de structure, pratique devenue plus courante avec les forages plus profonds et partant plus coûteux. Bien que le microscope ait révélé, en qualité, bien des données précieuses sur la nature physique de la formation, les services de prospection ont reconnu la nécessité de faire des mesures effectives de propriétés telles que la perméabilité et la porosité. Ainsi, l'année 1937 voit l'industrie faire des études plus intensives de carottes de nouveaux puits et de carottes de projets d'extraction secondaire.

Par la détermination de la perméabilité, de la porosité, des teneurs en pétrole et en eau, ainsi qu'en sels, on sait par avance si la formation va donner un puits producteur. Mais ce travail n'est pas infaillible. A l'heure actuelle, il a des phases spéculatives pour ce qui est du contenu du roc formant réservoir, et cela bien que les carottes soient bien protégées à la sortie de la tour de sondage. Il est clair que par suite de la réduction de pression le contenu des carottes n'est pas le même qu'il l'était avec le roc en place.

Un autre sujet de spéculation est la nature du sel qu'on peut trouver. Est-il en solution ou sous la forme de sel solide? La méthode courante ne laisse pas assez de temps pour résoudre cette question, bien que si la formation soit connue en général pour être exempte d'éléments évaporés, les essais de sel deviennent plus sûrs et cela quel que soit le soin pris avec les carottes au chantier. En dépit des limites des analyses de carottes, les propriétés physiques du roc réservoir sont reconnues comme une aide précieuse en prospection, et même après qu'un champ a été défini et mis en production, cette donnée est utile dans l'étude du rendement du puits et de la concession.

C'est en 1937 qu'on a obtenu pour la première fois dans le Centre des résultats de grand rapport par noyage, et au cours des trois dernières années on a étudié en détail un grand nombre de carottes d'extraction secondaire. La pratique courante a été de faire usage du foret à pointe de diamant à cause de l'importance qu'il y a à déterminer la

(Continué sur Page 161)

nar muy bien a los soldadores. Esta enseñanza se les da prácticamente en un taller de soldadura donde se soldan secciones de tubo. Se toman muestras de estas secciones soldadas, para su verificación y estudio. Cuando el soldador ha adquirido una pericia que le permita hacer continuamente buenas soldaduras, queda entonces preparado para ir al pozo y hacer el trabajo de instalar eficazmente largas series de tubos.

Para facilitar el manejo y activar las operaciones, se perforan uno o dos agujeros auxiliares cerca del pozo. Por uno de los agujeros se baja una sección de tubos, ordinariamente de 40 pies de longitud, de modo que su extremo superior sobresalga un poco por arriba de la altura de la plataforma de la torre de sondaje o perforación. Una segunda sección de tubos se coloca encima del extremo superior de la primera y ambas secciones se unen en este punto mediante abrazaderas especiales para este fin. Los soldadores proceden ahora a unir por soldadura estas dos secciones de tubos, y terminada la soldadura, esta serie de dos secciones unidas es izada por la torre y luego bajada sobre el extremo superior de la serie de revestimientos que hay ya metida en el pozo. Las series de arriba y de abajo se alinean y conectan por abrazaderas y los soldadores completan la unión final. Esta tubería se prepara especialmente para este trabajo, en la misma fábrica. Por lo general, se labra una ranura circular en los extremo del tubo, de modo que al acoplarse dos ranuras, forman una sección semicircular, con bastante espacio para segura soldadura. Las ranuras se llenan con metal de soldadura, el cual sobresale de la superficie normal del tubo. Estas soldaduras han mostrado una resistencia igual a la del mismo tubo y pueden hacerse con suma rapidez.

Una variante de esta práctica es el empleo de revestimiento de unión corrediza, el cual se hace recalcando un extremo del tubo de modo que pueda introducirse apretadamente en el extremo abocinado del tubo al cual se conecta y terminando la unión entre ambos por soldadura, de la manera de costumbre.

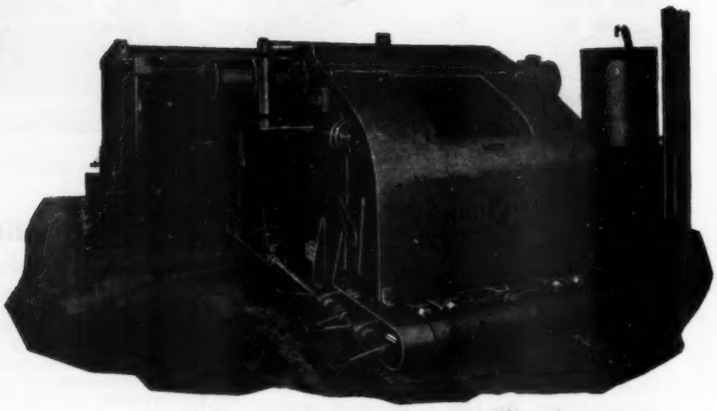
CANONES PARA SACAR MUESTRAS

Debido a la creciente atención que se está dando a la obtención de muestras de partículas sólidas y de núcleos completos de roca, representativos de las varias formaciones, se ha intensificado el esfuerzo por desarrollar procedimientos técnicos más convenientes para hacer el trabajo. Hay ahora cañones o tubos para sacar muestras, de tipo perfeccionado, con cilindros interiores no giratorios y mecanismos modificados para la retención de la muestra. El Empleo de barro coloidal, lo mismo que la perforación con petróleo, ha permitido a los ingenieros obtener muestras de primer orden, las cuales están ahora bajo examen de laboratorio, para determinar las diversas características de las formaciones.

(Continué en Página 161)

Portable Rigs

FOR 4000 AND 6000 FOOT DRILLING
POUR FORAGE DE 4000 ET 6000 PIEDS
PARA PERFORACION DE 4000 y 6000 PIES

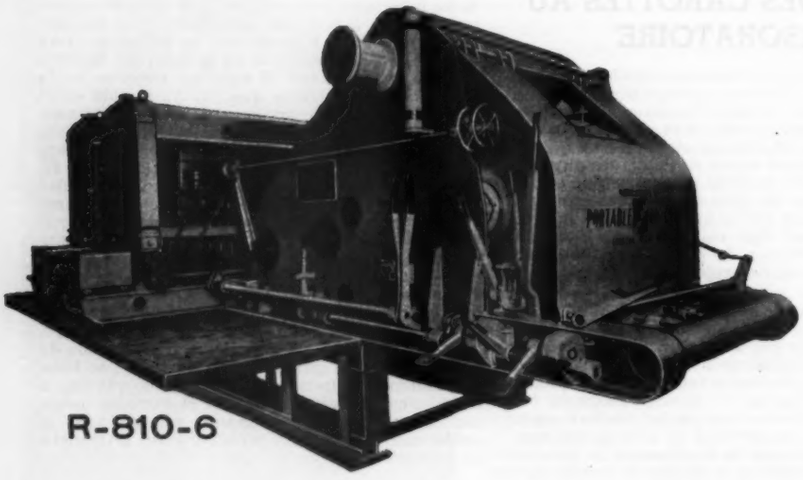


R-876-8

Right—Front view of draw works showing centralized controls of entire rig including air valve to engine clutches, water circulating tank for brakes, and filter for lubricating system.

A droite—Vue de face de groupe de traction où l'on voit les commandes centralisées du groupe entier, y compris soupape à air jusqu'à embrayages de moteur, réservoir à circulation d'eau pour les freins, et filtre pour système de graissage.

Derecha—Vista delantera de la máquina de perforar (o máquina de tracción) con centralización de todos los gobiernos, incluyendo la válvula neumática a los embragues del motor, tanque o depósito de gaua de circulación para los frenos y filtro para el sistema de lubricación.



R-810-6

Above—Front view of draw works showing all controls located at driller's position. Draw works is completely enclosed, force feed lubricated, and can be easily transported.

Ci-dessus—Vue de face de groupe de traction où l'on voit toutes les commandes situées à la position du foreur. Ce groupe de traction est complètement clos, graissé sous pression, et de transport facile.

Arriba—Vista delantera de la máquina de perforar, con todos los controles o gobiernos al immediato y fácil alcance del operario. Este modelo está completamente cubierto, tiene lubricación bajo presión y puede ser transportado con facilidad.

MODEL R-876-8 FOR 6000-FOOT DRILLING: Eight speeds forward, six speeds reverse on drum, rotary shaft, and sand reel (optional); self-energizing brakes, with double compound leverage, are water-cooled by circulation in shoes attached to bands; dual engine drive (gasoline, natural gas or Diesel fuel engines) can be compounded into draw works or pumps; air controlled engine clutches, and heavy-duty friction clutches on drum and rotary shafts; force-feed lubrication to all chains, bearings, sprockets and shafts. Substructure fits any size derrick.

MODEL R-810-6 FOR 4000-FOOT DRILLING: Three speeds forward and two speeds reverse on drum and rotary shafts and sand reel (optional); self-energizing brakes with double compound leverage, conventional type standard, water cooled type optional; dual engine drive (gasoline, natural gas or Diesel fuel engines) can be compounded into draw works or pumps; friction clutches on drum and rotary shafts; force feed lubrication to all chains, bearings, sprockets and shafts; substructure provides walkway around entire rig.

MODELE R-876-8 POUR FORAGE A 6000 PIEDS: Huit vitesses avant, six vitesses arrière sur tambour, arbre rotatif, et moulinet à sable (facultatif); freins auto-serreurs, avec système de leviers composé double, refroidis à l'eau par circulation dans des sabots fixés aux rubans; double commande de moteur (moteurs à essence, à gaz naturel ou à carburant Diesel) pouvant être montée sur groupe de traction ou pompes; embrayages de moteur pneumatiques, et embrayages à frottement de service dur sur arbres de tambour et de rotatif; graissage sous pression à toutes les chaines, les paliers, les pignons et les arbres. Sous-structure s'adaptant à toute grandeur de tour de sondage.

MODELE R-810-6 POUR FORAGE A 4000 PIEDS: Trois vitesses avant et deux vitesses arrière sur arbres de tambour et de rotatif et moulinet à sable (facultatif); freins auto-serreurs avec système de leviers composé double, type classique standard, type refroidi à l'eau facultatif; double commande de moteur (moteurs à essence, à gaz naturel ou à carburant Diesel) pouvant se monter sur groupe de traction ou pompes; embrayages à friction sur arbres de tambour et de rotatif; graissage sous pression à toutes les chaines, les paliers, les pignons et les arbres; sous-structure offrant passage tout autour du groupe.

MODELO R-876-8 PARA PERFORACION DE 6000 PIES: Ocho velocidades hacia delante, seis velocidades hacia atrás en el tambor, árbol rotativo y carrete o tambor para arena (a elección); frenos de acción automática, con sistema de palancas compound doble, enfriados por agua que circula en las zapatas unidas a las cintas o bandas; doble propulsión de motor (con motores de gasolina, de gas natural o de ptróleo de tipo diésel) puede instalarse en combinación en la máquina o en las bombas; embragues de motor con gobiérno neumático y embragues de fricción de trabajo pesado en el tambor y los árboles rotativos; lubricación de alimentación bajo presión a todas las cadenas, cojinetes, ruedas dentadas y árboles. Subestructura adaptada a cualquier tamaño de torre de taladrar.

MODELO R-810-6 PARA PERFORACION DE 4000 PIES: Tres velocidades hacia delante y dos velocidades hacia atrás en el tambor y los árboles rotativos y carrete para arena (a elección). Frenos de acción automática, con sistema de palancas compound doble, de tipo normal, con elección a tipo enfriado por agua; doble propulsión de motor (con motores de gasolina, de gas natural o de petróleo de tipo diésel) puede instalarse en combinación en la máquina o en las bombas; embragues de fricción en el tambor y los árboles; lubricación de alimentación bajo presión a todas las cadenas, cojinetes, ruedas dentadas y árboles; la subestructura provee pasillo cómodo.

more intensive studies of cores of new wells and of cores for secondary recovery projects.

Permeability, porosity and oil and water determinations, along with salt determinations, indicate whether the formation should make a producing well. This work is not infallible. At present, it involves speculative phases as to the content of the reservoir rock, even though the core samples are well protected on the derrick floor. Obviously, with reduction in pressure the core contents are not the same as they were with the rock in place.

Another subject of speculation is the nature of the salt that may be found. Is it in solution or is it in the form of solid salt? Routine procedure does not provide ample time for the solution of this question, although if the formation in general is known to be free of evaporates, the salt tests become more dependable regardless of the care taken with the core samples in the field. In spite of the limitations of core analyses, the physical properties of the reservoir rock are recognized as a valuable aid in exploration, and even after a field is defined and on production this information is of value in the study of well and lease behavior.

In 1937 the first large-scale flooding results in the Mid-Continent were obtained, and in the past three years a large number of secondary recovery cores have been studied in detail. The common practice has been to use the diamond drill because of the importance of determining the quantity of oil left and the permeability and porosity of the whole pay section. The trend now for all secondary recovery projects, repressuring and flooding, is toward making a core survey before investing.

In connection with the estimate of national reserves in place, recent core studies indicate the average oil-sand pay contains connate water distributed throughout the vertical section of the sand body, and the amount of this water is significant in estimating reserves over large areas.

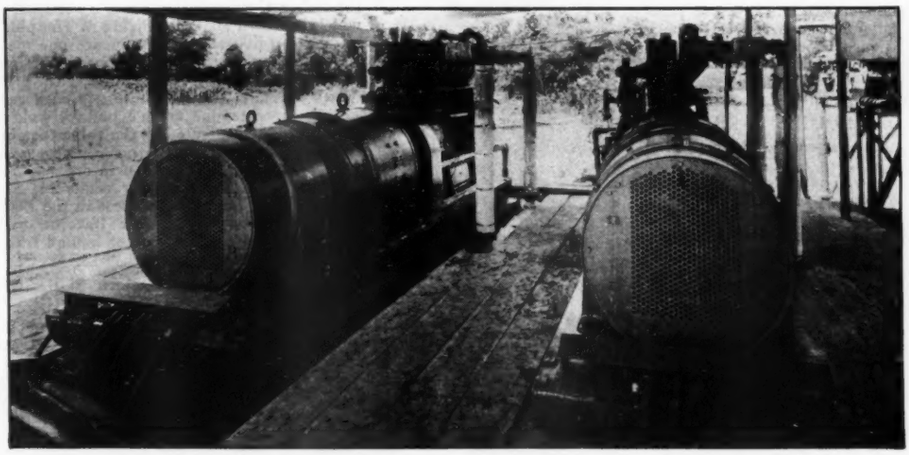
Old principles in the field of magnetism are now being used to determine the direction of dip of beds in core samples. In order to determine the degree of dip, information on the direction and degree of deviation from the vertical of the hole is necessary. Cores are sent to the laboratory and the magnetic north of each core is determined. The method of determination is based upon the fact that most sediments other than limestones contained sufficient small magnetizable particles to be aligned with the earth's magnetic field that existed during the period of deposition. It is possible to determine this alignment of particles by examining the core

(Continued on Page 174)

quantité de pétrole qui reste, ainsi que la perméabilité et la porosité de toute la section payante. La tendance actuelle pour tous les projets d'extraction secondaire, remise sous pression et noyage, est de faire une prospection par carottes avant de s'engager.

Au sujet de l'évaluation des réserves nationales de l'avenir, de récents examens de carottes ont indiqué que le sable pétrolier courant contient de l'eau de formation répartie sur toute la longueur de la section verticale de la masse sableuse, et la proportion de cette eau est un facteur décisif dans l'évaluation des réserves sur de grandes étendues.

On applique à l'heure actuelle d'anciens principes du domaine du magnétisme pour déterminer la direction de pente des couches dans les carottes. Afin de déterminer le degré de pente, on a besoin de données sur la direction et le degré de déviation par rapport à la verticale du trou. On envoie les carottes au laboratoire et pour chacune d'elles on détermine le Nord magnétique. Ce procédé est basé sur le fait que la plupart des sédiments en dehors des calcaires contenaient assez de petites particules aimantables pour s'aligner avec le champ magnétique de la terre qui existait pendant la période de sédimentation. Il est possible de déterminer cet alignement de particules en examinant la carotte au laboratoire et si l'on dispose d'échantillons d'affleurement de la strate carottée il est possible de déterminer la déviation par rapport au Nord magnétique régnant et la carotte peut ainsi être orientée avec une plus grande précision pour ce qui est de la direction des couches. Des organisations et des individus ont actuellement à l'étude des méthodes visant à faire ces mesures, mais on ne sait pas encore le degré de précision offert par ces techniques diverses.



Diesel engine-electric generator power plant for rotary drilling outfit
Groupe-force electrogene a moteur diesel pour appareillage de forage rotatif
Instalacion de generador electrico accionado por motor diesel, para el equipo de perforacion rotativa

ESSAIS A LA TIGE DE FORET

Dans certaines sections des régions pétrolifères il est courant de faire des essais à la tige de foret pour savoir si la formation est productrice ou non. Essentiellement l'essayeur de tige de foret consiste d'un tampon pour exclure la section du puits située au-dessus de la formation à essayer et d'une vanne à pivot qu'on peut ouvrir après qu'on a fait descendre l'essayeur à la position désirée dans le puits. De cette manière le gaz, le pétrole et l'eau de la formation qu'on essaie ont la chance de s'échapper par l'intérieur de la tige de foret à laquelle l'essayeur est fixé. Le liquide de forage à l'intérieur du puits est séparé de la formation essayée par le tampon. Par ce moyen l'énergie contenue dans la zone qu'on essaie peut agir pour forcer le gaz, le pétrole ou l'eau dans la tige de foret, et il est d'usage courant de laisser la vanne de l'essayeur ouverte pendant un certain temps fixé à l'avance, puis de juger de la productivité de la formation en mesurant la hauteur à laquelle le fluide s'est élevé dans la tige de foret. Cette mesure s'exprime en tant de "fourbles" de fluide produits en une certaine période de temps. Si le taux de production est favorable, on peut terminer le puits au point où on a fait l'essai. Si ce taux n'est pas

(Continué sur Page 174)

MUESTRAS BAJO ESTUDIO DE LABORATORIO

El geologista, desde hace años, se ha valido de muestras para estudios de correlación y estructura, y esta práctica ha crecido a medida que se ha ido profundizando la perferación, con un correspondiente aumento en gastos. A pesar de que el microscopio ha revelado, en forma cualitativa, mucha importante información relativa el caracter físico de la formación, los departamentos de exploración han reconocido la necesidad de obtener medidas verdaderas de tales importantes propiedades como la permeabilidad y la porosidad. Por esta razón, en 1937 la industria se dedicó a estudios más intensos de las muestras sacadas de pozos nuevos y de las muestras de pozos en proyecto de recuperación secundaria.

La permeabilidad, la porosidad y las determinaciones de petróleo y agua, conjuntamente con las determinaciones de sales, indican generalmente si la formación es apta para convertirse en pozo productivo. Este trabajo, sin embargo, no es infalible. Al presente, ofrece fases especulativas en lo tocante al contenido de la roca del yacimiento, aun cuando las muestras cortadas queden bien protegidas en la plataforma de la torre. Por supuesto, al reducirse la presión, el contenido de la muestra no es igual al que existía cuando la muestra estaba en la roca.

Otro punto de especulación es al caracter de la sal que puede presentarse. ¿Está en solución o está en la forma de una sal sólida? El procedimiento corriente no provee amplio tiempo para la solución del problema; sin embargo, cuando se sabe que la formación, en general, está exenta de elementos evaporables, los ensayos de sal resultan más dignos de confianza, sin consideración del cuidado que se dé a las muestras en al campo. A pesar de las limitaciones en el análisis de muestras, las propiedades físicas de la roca del yacimiento se aceptan como muy valiosa ayuda en el trabajo de exploración, y aun después de haberse definido y puesto en explotación un campo, esta información es de valor en al estudio del pozo y rendimiento general de la propiedad.

En 1937 se obtuvieron los primeros resultados del procedimiento de inundación, en grande escala, en la región central del país, y durante estos últimos tres años se ha estudiado un gran número de muestras de recuperación secundaria. La práctica corriente ha sido emplear un taladro diamantino, en vista de la importancia de la determinación de la cantidad de petróleo dejada y de la permeabilidad y porosidad de toda la sección productiva. La tendencia actual, en lo tocante a todo proyecto de recuperación secundaria, por presión e inundación, es en el sentido de estudiar las muestras, antes de hacer la inversión.

En conexión con el cálculo de las reservas nacionales sin tocar, recientes estudios de muestras indican que el promedio de la arena petrolífera contiene agua fósil distribuída por toda la sección vertical del cuerpo arenoso. La cantidad de esta agua significa mucho en el cálculo de las reservas en grandes extensiones.

Antiguos principios científicos, en materia de magnetismo, se están ahora utilizando para determinar la dirección de la inclinación de las capas en las muestras de roca. Para determinar el grado de inclinación, es necesario tener información sobre la dirección y grado de desviación de la línea vertical del agujero. Las muestras se envían al laboratorio y aquí se determina el norte magnético de cada una. El método de determinación se basa sobre el hecho de que casi todos los sedimentos, para quedar coincidentes con el campo magnético de la tierra que existía durante el período de la acumulación. Es posible determinar esta alineación de las partículas mediante examen de la muestra en el laboratorio. Cuando hay muestras de la capa superficial del yacimiento, es también posible determinar la desviación del prevaleciente norte magnético, y de este modo, la muestra de roca puede orientarse con mayor exactitud en lo tocante a la dirección de las capas. Varias firmas particulares están trabajando en métodos para tomar estas medidas, pero la seguridad de los varios procedimientos técnicos seguidos para este fin no se halla todavía firmemente establecida.

ENSAYOS CON VASTAGO DE SONDA

En ciertas regiones petroleras de este país, se recurre a menudo al ensayo con vástago de sonda,

(Continué en Página 174)

BAKER

LA NORMA DEL MUNDO PARA LA SEGURA GUIA Y FLOTACION DE HILERAS DE REVESTIMIENTO DE CUALQUIERA LONGITUD. PROVEE EL MEDIO MAS SEGURO DE HACER UN PERFECTO TRABAJO DE CEMENTACION, Y LUEGO PUEDE SER PERFORADO FACILMENTE, DESMENUZANDOSE EN PEQUENOS E INOFENSIVOS FRAGMENTOS DE FACIL EXPULSION DEL AGUJERO.

STANDARD OF THE WORLD FOR SAFELY GUIDING AND FLOATING STRINGS OF CASING OF ANY LENGTH. PROVIDES THE MOST SUCCESSFUL MEANS OF SECURING PERFECT CEMENTING RESULTS, AND THEN IS EASILY DRILLED UP INTO SMALL, HARMLESS FRAGMENTS WHICH CIRCULATE OUT OF THE HOLE.

EN EL CATALOGO DE COMBINACION DAMOS DETALLES COMPLETOS
COMPLETE SPECIFICATIONS ARE IN THE COMPOSITE CATALOG

EQUIPO DE CEMENTAR BAKER
Para la guía, la flotación y cementación de revestimiento

La moderna práctica de flotar revestimiento en un pozo de poca o de gran profundidad se acepta hoy día como el método más seguro y económico. Sin embargo, la colocación y la cementación del revestimiento no constituyen una verdadera medida completa para apreciar el valor práctico del equipo de cementación y flotación. Todo dispositivo que venga a impedir o dificultar la adicional perforación y extracción de muestras no sólo pone en peligro la satisfactoria terminación del pozo, sino que puede también ser más tarde, causa directa de la anegación de agua y otras serias dificultades.

UD. PUEDE SACAR PROVECHO DE NUESTRA EXPERIENCIA

La Baker Oil Tools, Inc., una de las primeras del ramo, se ha dedicado con especialidad a la construcción de equipo para la colocación y cementación de revestimiento en pozos de petróleo, desde hace más de 25 años. Empezando con la Zapata de Revestimiento de Modelo Baker (descrita en otras página de este anuncio) procedimos luego a perfeccionar un equipo de flotación con válvula de hierro fundido, y más tarde, un surtido completo de equipo de cementación Baker, en el cual, el grupo de tapón y válvula se hace enteramente de hormigón de una fórmula exclusiva, y de baquelita especial.

Hoy día, todo el equipo de cementar Baker está completamente exento de metal en su construcción interior. Las zapatas guiadoras y otras piezas similares, llevan hormigón sólo en la parte interior de la zapata o collar de acero. Todas las unidades de "flotación" tienen un tapón de hormigón, con el grupo de válvula de contrapresión hecho de baquelita.

DETALLES DE LAS EXCLUSIVAS VENTAJAS DEL EQUIPO BAKER

Un tipo muy popular de equipo de cementar Baker es la Zapata Flotadora de Cemento Baker, cuya vista seccional mostramos arriba en la figura 1. El tapón y la guía ovalada en el fondo constituyen una masa de hormigón, firmemente anclada en ranuras fresadas en una zapata de revestimiento de acero sin costura. Un grupo de válvula de contrapresión, de baquelita, se halla anclado dentro del tapón de hormigón, y un agujero cilíndrico baja por el hormigón, entrando en la cámara de la válvula.

La bola de la válvula de baquelita tiene cierto peso específico, que le permite flotar en el barro o cieno ordinario de rotativa, o en el cemento empleado para la cementación del revestimiento. Un anillo de caucho se coloca en en una depresión del asiento de la válvula de baquelita, permitiéndose, de este modo, que la bola de baquelita tenga un asiento doble en el anillo de caucho, debajo del cual se halla el cuerpo de baquelita bien anclado en hormigón.

COMO Y POR QUE ESTA UD. SEGURO DE UN FUNCIONAMIENTO CORRECTO

Es evidente que cuando se empieza a bajar el revestimiento por el hoyo, la firme guía de hormigón pasará sin dificultad por toda leve irregularidad que se presente en la pared del hoyo. Esta guía de hormigón no puede trizarse o romperse mientras va conduciendo el revestimiento en su descenso por el pozo, y tampoco puede aplastarse o deformarse, al ser colocada en el fondo, a causa de que el hormigón de especial composición de que se hace, puede resistir dos veces más peso que el hormigón de tipo corriente.

Mientras el revestimiento se va bajando en el hoyo, la más leve presión ascendente, a través de la zapata flotadora de cemento Baker, hace que la bola, de baquelita se levante instantáneamente, estableciendo un cierre hermético y positivo, por su contacto íntimo con el anillo de caucho. En este punto empieza la "flotación" del revestimiento. Debido a la construcción del tapón y la válvula interiores, y a la firmeza del hormigón y de la baquelita empleadas en la construcción, todo producto de "flotación" Baker posee suficiente fuerza para soportar y colocar el revestimiento, sin

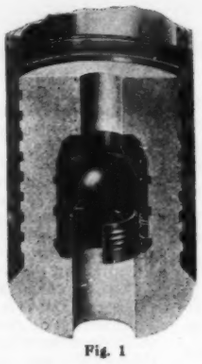


Fig. 1

Fig. 2

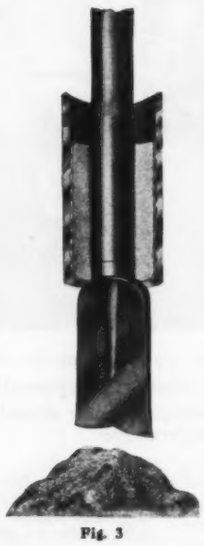


Fig. 3

Fig. 4

BAKER CEMENT EQUIPMENT
For Guiding, Floating and Cementing Casing

The modern practice of floating casing in a well, whether it is shallow or deep, is acknowledged to be the safe and economical method to use. However, the landing and cementing of the casing is not the true full measure by which cementing and floating equipment should be judged. Any device which will interfere with further drilling and coring operations not only endangers the successful completion of the well, but may be the cause of future water encroachment and other serious troubles.

YOU CAN PROFIT THROUGH OUR EXPERIENCE

Baker Oil Tools, Inc., have pioneered and specialized for more than 25 years in equipment for landing and cementing casing in oil wells. Starting with the Baker Pattern Casing Shoe (described on a following page in this section), we then developed floating equipment with a cast-iron valve, and later the complete line of Baker Cement Equipment in which the entire plug and valve assembly is made exclusively from concrete of a proved special formula, and special Bakelite.

Today all Baker Cement Equipment is entirely free from metal of any kind in its internal construction. Guide Shoes, and similar products, have concrete only inside the steel shoe or collar. All "floating" units have a plug made of concrete, with the back-pressure valve assembly made of Bakelite.

DETAILS OF EXCLUSIVE BAKER ADVANTAGES

A widely used type of Baker Cement Equipment is the Baker Cement Float Shoe, a sectional view of which is shown above in Figure 1. The plug and the rounded guide at the bottom are one mass of concrete which is securely anchored in grooves machined in a seamless steel casing shoe. A Bakelite back-pressure valve assembly is anchored inside of the concrete plug, and a cylindrical hole leads down through the concrete into the valve chamber.

The Bakelite Valve Ball is made with a specific gravity which permits it to float in ordinary rotary mud or in the cement used for cementing casing. A rubber ring is placed in a recess in the Bakelite valve seat, thus permitting the Bakelite ball to form a double-seal against rubber behind which is Bakelite anchored in concrete.

HOW AND WHY YOU ARE SURE OF SUCCESSFUL PERFORMANCE

It is evident that when the casing is started down the hole, the strong concrete guide will safely pass any slight irregularities in the wall of the hole. This concrete guide will not shatter or fracture while guiding casing down the well, and it will not crush when set on bottom, because the specially mixed concrete from which it is made will withstand more than two times as much weight as the ordinary construction concrete.

As the casing is lowered in the hole, the smallest amount of pressure upward through the Baker Cement Float Shoe will instantly cause the Bakelite Ball to move upward, where it provides a positive, leak-proof seal, against the rubber ring, and "floating" of the casing has commenced. Due to the design of the internal plug and valve, and the strong concrete and Bakelite used in construction, any Baker "Floating" Product possesses sufficient strength to safely land casing, regardless of the length of the string. In fact, with but few exceptions any Baker Cement Float Shoe or Float Collar will withstand pressures which would collapse the casing, and no experienced operator would even closely approach this collapsing point.

CEMENTING EFFICIENCY

When pump pressure is applied, the ample circulation area through the valve assembly insures unrestricted passage of the cement, but the fluid passageways are not too large for an effective washing action which is very desirable when heavy mud or cavings are present in the well.

After all desired cement has passed through the shoe and upward around the outside of the casing, pump pressure is relieved and the Bakelite Ball instantly moves upward against the rubber ring where a positive leakproof seal is formed against

FIRMEZA para la segura colocación de cualquier hilera de revestimiento.
RENDIMIENTO DE VALVULA para la flotación y distribución del cemento y su sujeción en su sitio.
FRIABILIDAD para seguridad en futura perforación y extracción de muestras.

STRENGTH for safely landing any string of casing.
VALVE EFFICIENCY for floating and for distributing the cement and holding it in place.
DRILLABILITY for safety of future drilling and coring.

GUSTOSAMENTE ENVIAREMOS A TODO EXPLOTADOR DE PETROLEO UN EJEMPLAR DE NUESTRO COMPLETO CATALOGO ILUSTRADO. SIRVASE DARNOS SU NOMBRE Y DIRECCION. DIRIJASE TODA CORRESPONDENCIA A NUESTRA OFICINA PRINCIPAL

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ENDEREZADOR HIDRAULICO PORTATIL BAKER PARA KELLY Y TUBO

Este eficaz dispositivo de fácil funcionamiento utiliza el principio del ariete hidráulico, aplicando la fuerza desarrollada por una bomba manual, a cualquier curva en el kelly, collar de perforación o tubo de perforación, mientras el grupo está suspendido de la grúa. El equipo puede transportarse fácilmente al pozo en un pequeño camión o vagón de remolque, y con la ayuda de roldana u otro aparejo similar, colocarse bien sobre la plataforma de la rotativa, para hacer el trabajo, como se ve en la ilustración 40.

Con este equipo, se cuenta con la ventaja de poder enderezar las conexiones kelly y las juntas torcidas del tubo de perforación, mientras están suspendidas en posición de trabajo, con la ayuda de la grúa. Las conexiones kelly no necesitan quitarse y luego levantarse. No hay que llevarlas a un taller. Se ahorra mucho tiempo en el trabajo de enderezamiento y el peligro de que las piezas se vuelvan a doblar o torcer durante su manipulación se elimina del todo.

En los campos extranjeros, el enderezar estas piezas respresenta un gasto muy subido y una considerable pérdida de tiempo. El taller competente para hacer estos trabajos de enderezamiento puede hallarse muy retirado del campo, lo que dificulta más aún la situación, y cuando no hay piezas de repuesto, se presenta la pérdida de valioso tiempo. Todas estas dificultades pueden evitarse con un enderezador Baker.

ENDEREZAMIENTO DE UNA KELLY

El ENDEREZADOR se levanta fácilmente con una grúa y se coloca en posición vertical encima de la plataforma de la rotativa, como se ve en la figura 40, de la cual se han quitado los soportes de la kelly.

Después de haber extraido todo el tubo perforación, se descubre el punto ladeado o torcido, generalmente con cuerdas apretadas de como la mitad del diámetro de un lapiz colocadas en las caras adyacentes de la kelly. La kelly se baja entonces hasta que el punto de máximo torcimiento quede a una distancia, encima de la plataforma, igual a la del ariete en el enderezador. Esto puede hacerse antes o despues de que el aparato se haya colocado en la plataforma.

Una fuerza suficiente para hacer que la kelly quede en contacto con las piezas separadoras se aplica primero, mediante la bomba hidráulica. La vista superior en la figura 41 muestra los detalles. Una regla se coloca ahora transversalmente al frente de los balancines y se mide ahora la distancia entre este punto y la kelly.

Para determinar la elasticidad de la kelly, se aplica y quita presión varias veces, midiendose cada vez la distancia entre la regla y la kelly. Es importante medir con exactitud esta distancia, para determinar la cantidad de flexión que puede resistir la kelly antes de que llegue al límite de su elasticidad o quede permanentemente torcido o ladeado en una posición fija.

Después de que se haya determinado este límite de elasticidad, todo lo que se requiere es forzar la kelly un punto más allá del que se necesita para enderezarla. A continuación se levanta y se ensaya con cables bien tiesos. Cuando la pieza no retiene su forma, después de haber sido enderezada, unos pocos golpes de martillo, mientras está bajo presión, la dejan en buen estado.

ENDEREZAMIENTO DE TUBO DE PERFORACION

El tubo de perforación se endereza con el separador en posición invertida, tal como se hace para la kelly, y como se muestra en la vista de abajo en la figura 41, y en la figura 42. Se determina el punto de máximo ladeamiento o torcedura, en el tubo de perforación, mientras se gira en la plataforma de la rotativa. El tubo se baja entonces y el punto saliente se marca con tiza mientras el tubo está girando. El paso siguiente es enderezarlo con la máquina.

Fig. 40

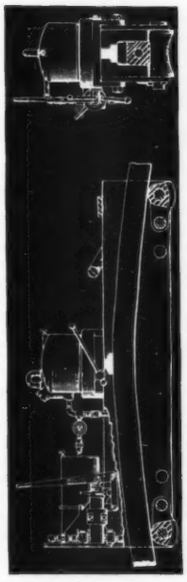

Fig. 41

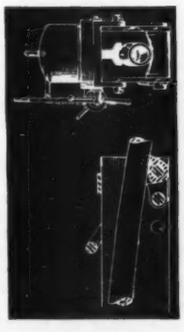

Fig. 42

BAKER PORTABLE HYDRAULIC KELLY AND PIPE STRAIGHTENER

This very efficient and easily operated device utilizes the principle of the hydraulic ram, applying the force built up by a hand operated pump to any bend in the Kelly, Drill Collar, or Drill Pipe while it hangs suspended in the derrick. It can be readily transported to the well on a small "pickup" truck or trailer and, by means of the catline, is easily set up on the rotary table for operation, as shown in Figure 40.

With this equipment you can secure the many advantages of straightening bent or kinked Kellys or joints of Drill Pipe, as they hang in normal operating position suspended in the derrick. Kellys do not have to be laid down and picked up; they do not have to be transported to a shop; time is saved in the straightening operation; and the danger of again bending during handling is eliminated.

In foreign fields, moreover, the costs of straightening a Kelly or drill pipe and the expense of time thus lost are a serious matter. A shop capable of straightening the Kelly may be far away and difficult to reach, and when a substitute Kelly is not at hand the time lost represents a considerable expense. This can all be avoided by having a Baker Kelly Straightener available.

STRAIGHTENING A KELLY

The STRAIGHTENER is easily picked up with the catline and placed in a vertical position on the rotary table (see Figure 40) from which the Kelly Bushings have been removed.

After all the drill pipe has been pulled, the bent place is located, usually with tight lines about one-half the diameter of a lead pencil, placed on adjacent faces of the Kelly. The Kelly is then lowered until the point of maximum bend is at a distance above the rotary table equal to that of the ram in the Straightener. This can be done either before or after the device has been set up on the table.

Just enough pressure to force the Kelly into contact with the spacer saddles is first applied by use of the hydraulic pump; for details refer to Figure 41, upper view. A straight-edge is placed across the front of the beams and the distance from it to the Kelly is measured.

In order to determine the spring or elasticity of the Kelly, pressure is applied and released several times, with a close measurement each time being made of the distance between the straight-edge and the Kelly. It is important that this measurement be closely watched to determine the amount the Kelly will spring or bend before it will have reached its elastic limit, or have been permanently bent in a set position.

After this elastic limit has been determined, all that is necessary to do is to force the Kelly slightly beyond the point required to bend it straight. It is then raised and tested with taut chalk lines. When Kellys will not retain their shape after being straightened, a few light taps with a hammer while the Kelly is under pressure will overcome the difficulty.

STRAIGHTENING DRILL PIPE

Drill pipe is straightened with the Spacer reversed (as shown in Figure 42 and lower view in Figure 41) in the same manner as a Kelly, by observing to locate the point of maximum bend in the drill pipe while rotating the drill pipe in the rotary table. The pipe should then be lowered and the high point marked with chalk while again being rotated. Then proceed as when straightening a Kelly.

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in the laboratory and if outcrop samples of the cored strata are available it is possible to determine the deviation from the prevailing magnetic north and in this way the core can be more accurately oriented as to direction of beds. Organizations and individuals are working on methods for making these measurements, but the reliability of the various technics is not known at this time.

DRILL STEM TESTS

In some sections of the oil country drill stem testing is common to determine whether the formation is productive or nonproductive. Essentially the drill stem tester consists of a packer to shut off the section of the well above the formation to be tested and a rotarable valve which can be opened after the tester has been run to the desired position in the hole. In this manner the gas, oil or water in the formation being tested is permitted to escape into the inside of the drill stem to which the tester is attached. The drilling fluid in the hole is shut off from the formation tested by the packer. By this means the energy within the zone being tested can exert itself to force the gas, oil or water into the drill stem, and it is usual practice to allow the valve on the tester to remain open for a predetermined time and then judge the productivity of the formation by measuring the height to which the fluid has risen inside the drill stem. This is expressed as so many fourbles of fluid produced in a given period of time. If the rate of production is favorable, the well can be completed at the point where the test was made. If not favorable, the part of the hole below the packer-seat is reamed to full size and drilling resumed. The necessity of setting casing before testing the formation is eliminated.

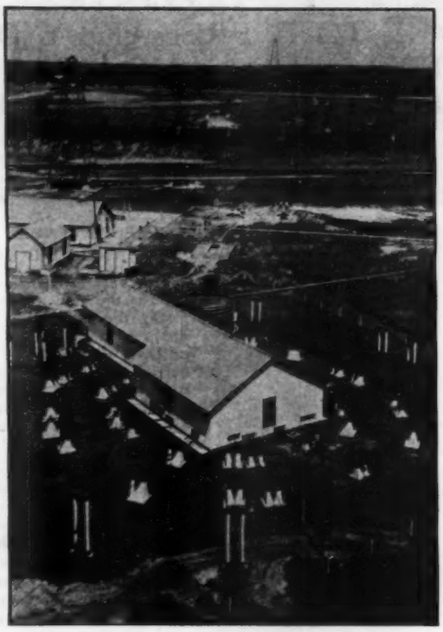
TIME CURVES

Another important step in rotary drilling has been the development and study of drilling-time curves. It is a well known fact that in cable-tool drilling the driller knows by the "feel" of the line about the kind of formations being penetrated. With rotary drilling much of this technique was lost until the development of weight-indicators. With these instruments, now highly perfected, it is possible for the driller to know the weight placed on the bit, the speed of the turntable, the pump speed and rate of penetration of the formation. By watching these the driller can determine when changes in formation occur. If these changes are recorded and speed of penetration is noted it is possible to correlate the formation tops closely. The manner in which the bit penetrates the formation indicates whether it is hard and dense or soft and permeable. These characteristics are only relative, but when properly recorded and studied they give much valuable information about the hole which later is checked by the study of cuttings and running of the electric coring device.

This method of studying formations has been rather highly developed in some fields, and when the sequence of beds is known and studies have been made of the rate of drilling them under a fixed set of conditions it is possible to correlate formations in different wells in the same field. This method of developing data has proven useful in completing the well and also in accumulating information to be used later in repairing it.

The drilling speeds stated in feet per hour and the depths are plotted on ordinary graph paper, using whatever scale is convenient for the engineer. It is usual to plot the vertical depths as ordinates and the drilling speeds as abscissas. The scales used may be 10 to 1 in ratio, for instance, 40

(Continued on Page 182)



Central power pumping eighteen wells
Groupe-force central pompant dix-huit puits
Central de bombas para diez y ocho pozos

favorable, on procède à un alésage à la cote de la partie du trou située sous siège du tampon, et on reprend le forage. Ainsi on n'a plus besoin de mettre en place le revêtement avant de faire l'essai de la formation.

COURBES DE VITESSES DE FORAGE

Une autre phase importante du forage rotatif a été la mise au point et l'étude de courbes de vitesses de forage. Chacun sait qu'en forage avec outils sur câble le foreur est renseigné en "tâtant" le câble sur le type de formation attaqué. Avec le forage rotatif cette technique s'est en grande partie perdue jusqu'à la création des indicateurs de poids. Grâce à ces instruments, maintenant très perfectionnés, il est possible au foreur de connaître le poids appliqué au trépan, la vitesse de la plaque tournante, la vitesse de pompage et la vitesse de pénétration dans la formation. En surveillant ces éléments, le foreur sait quand surviennent des changements de formation. Si on note ces changements, ainsi que la vitesse de pénétration, il est possible de coordonner avec exactitude les sommets de formations. La manière dont le trépan pénètre la formation indique si elle est dure et dense ou tendre et perméable. Ces données ne sont sans doute que relatives, mais si on les note et les étudie comme il faut elles fournissent des indications précieuses sur le puits qu'on vérifiera par la suite à l'examen des débris et au moyen du dispositif carottier électrique.

Cette méthode d'étude des formations a été poussée assez loin dans certains champs, et une fois qu'on connaît la suite des couches et qu'on a étudié la vitesse de forage à travers ces couches dans certaines conditions, il est possible d'établir la corrélation des formations entre les divers puits d'un même chantier. Cette méthode pour recueillir des données s'est montrée très utile pour achever le puits et aussi pour accumuler des indications fort précieuses en cas de réparation ultérieure du puits.

Les vitesses de forage en pieds à l'heure et les profondeurs sont portées sur du papier graphique ordinaire, l'ingénieur adoptant l'échelle de son choix. Il est d'usage de porter les profondeurs verticales en ordonnées et les vitesses de forage en abscisses. Les échelles adoptées peuvent être dans le rapport de 10 sur 1, par exemple 40 pieds par pouce pour les profondeurs et 4 pieds à l'heure par pouce pour la vitesse de forage.

Après qu'on a porté sur graphique les profondeurs et les vitesses de forage, on peut porter sur la même échelle verticale et sur la même feuille

(Continué sur Page 182)

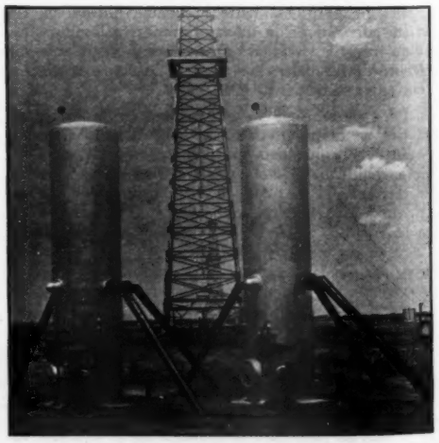
para determinar si la formación es productiva o no. Esencialmente el mismo ensayador de vástago de sonda está representado por un obturador para tapar o cerrar la sección del pozo arriba de la formación por ensayarse, y por una válvula giratoria, que se abre después de que el ensayador ha llegado a la posición deseada en el agujero. De esta manera, se permite que el gas, petróleo o agua en la formación, bajo ensayo, se escapen pasando al interior del vástago de la sonda, a la cual está conectado el ensayador. El obturador impide que el líquido de perforación en el agujero llegue a la formación bajo ensayo. Por lo tanto, la energía dentro de la zona bajo ensayo, puede así ejercerse para empujar el gas, petróleo o agua, metiéndolos dentro del vástago de la sonda. Generalmente se sigue la práctica de dejar abierta, durante un tiempo predeterminado, la válvula del ensayador, y luego se calcula la productividad de la formación midiendo la altura a que el líquido se ha levantado dentro del vástago de la sonda. Esta productividad se expresa en "fourbles" de líquido obtenida en un período de tiempo dado. Cuando es favorable el índice de productividad, el pozo se termina en el punto en que se ha hecho el ensayo. En caso de indicación desfavorable, la parte del agujero debajo del asiento del obturador, se agranda a diámetro completo y se prosigue con el sondaje o perforación. De este modo se evita la necesidad de colocar el revestimiento antes del ensayo de la formación.

CURVAS DE TIEMPO

Otro importante paso en la perforación rotativa ha sido el desarrollo y estudio de las curvas de tiempo en los trabajos de sondaje. Cosa bien conocida es que en la perforación con herramienta de cable, el operario sabe, por la sensación del tacto de la línea, qué clase de formación está perforando. Con la introducción de la perforación rotativa, se perdió mucho de esta técnica hasta el día en que se perfeccionaron los indicadores de peso. Con estos nuevas instrumentos, ahora grandemente refinados, el operario se da cuenta del peso o presión aplicado a la sonda, la velocidad de la tornamesa, la velocidad de la bomba y la velocidad de la perforación o penetración en la formación. Cuando se registran todos estos cambios y al mismo tiempo se toma nota de la velocidad de la penetración, es posible correlacionar bien aproximadamente el caracter general de la formación. La manera en que la sonda penetra en la formación indica si esta última es dura y densa o blanda y permeable. Estas características son sólo relativas, pero al ser registradas y estudiadas con cuidado, dan mucha valiosa información acerca del agujero, información que más tarde quede ser rectificada por un estudio de las partículas sólidas y el uso del aparato eléctrico para sacar muestras.

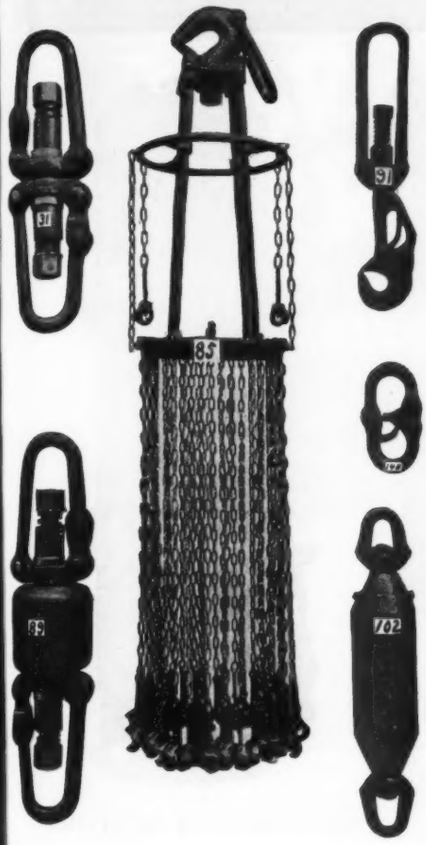
Este método de estudiar formaciones ha sido grandemiente perfeccionado en ciertos campos. Cuando se conoce la consecución de las capas y se

(Continué en Página 182)



Oil and gas separators handling production from flowing well
Separateurs de petrole et de gaz en service sur puits en production
Separadores de petroleo y gas para el manejo de la produccion de un pozo activo

RATIGAN SAFETY PRODUCTION EQUIPMENT



J. P. RATIGAN

1213 Santa Fe Ave.
LOS ANGELES,
CALIFORNIA

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FLANDERS & EICHE

Foreign Representatives

P. O. Box 51
SAN FERNANDO
TRINIDAD, B. W. I.

Ratigan Products Can Be Purchased At Leading Supply Stores

No. 31—Eslabón giratorio de resorte, para tubería, que se emplea en lugar del gancho corriente. Capacidad para 150.000 libras.

No. 89—Eslabón giratorio de resorte, para tubería, con peso adicional, para manejar series de varillas de aspiración. Capacidad para 150.000 libras.

No. 85—Colgador de varilla de aspiración, con gancho giratorio en cojinete de bolas, muy práctico y seguro. Se ofrece con cualquier número de grupos de 1 a 100.

No. 91—Gancho de seguridad de resorte para varilla de aspiración. El resorte sirve para tomar un grupo de la caja, cuando está destornillada, y ayuda también a mantener rectas las varillas mientras se separan. Capacidad para 90.000 libras.

No. 14-B—Estos eslabones en "C" se ofrecen en tres tamaños: No. 14-A con capacidad para 60.000 libras; No. 14-B para 100.000 libras y No. 14-C para 150.000 libras.

No. 102—Peso para líneas de varillas de aspiración, con asas giratorias montadas en cojinete doble de bolas, de 100 libras. Es hueco y puede admitir peso adicional hasta 400 libras.

No. 60-B—Mango plano; No. 60-A, mango de extensión; No. 60-H, mango cilíndrico. Todos son llaves de varilla de aspiración, de tipo de cierre automático. La acción automático evita el martilleo de los acoplamientos.

No. 106—Elevador de varilla de aspiración de seguridad, de acero tartado por especial calentamiento graduado. La ventaja principal de este elevador es que rodea a la varilla y evita su propia inclinación.

No. 122—La grapa de bloque de tubería es rápida y segura, cuando se levanta el bloque de tubería al bloque superior, para la conexión de las líneas antes de levantarlas.

No. 8, No. 50, No. 7, No. 2 pesado, No. 83 tipo de cuña—todos son agarres muy conocidos en todos los campos petrolíferos. El No. 2 pesado, con tornillo de cabeza cuadrada, es muy práctico para ciertos pozos.

No. 22—Este sostén de barra se emplea en conexión con todos los agarres.

No. 82—Los elevadores de varillas de aspiración de seguridad son del tipo de cerrojo delantero.

No. 92—Tenazas de tubería con mango cilíndrico, hechas de acero especial. Debido a su construcción exclusiva, el mango admite mandíbulas de 2", 2½", y 3".

No. 6-5—Grapa de líneas de alambre y No. 6-4 grillete de babbitt, que se emplean para conectar líneas de alambre al agarre No. 8 o al sostén de barra No. 22 durante la operación de bombeo.

No. 28—Conexiones abocinadas ofrecidas en tres tamaños, de 2", 2½" y 3".

No. 31—Spring Swivel Tubing Link is used in place of tubing hook. Capacity 150,000 lbs.

No. 89—Spring Swivel Tubing Link with added weight is used in pulling down sucker rod lines. Capacity 150,000 lbs.

No. 85—Sucker Rod Hanger with ball bearing swivel hook is very practical and safe. It is made with any number of stands 1 to 100.

No. 91—Spring safety sucker rod hook. Spring is designed to pick one stand off the box, when unscrewed and also helps to keep rods straight, when wrenching rods. Capacity 90,000 lbs.

No. 14-B—These "C" Links are made in three sizes, capacity No. 14-A 60,000 lbs.; No. 14-B 100,000 lbs.; No. 14-C 150,000 lbs.

No. 102—Sucker Rod Line Weight has double ball bearing swivel bails and weighs 100 lbs. It is hollow, designed to take additional weight up to four hundred lbs.

No. 60-B—Flat Handle, No. 60-A Extension Handle; No. 60-H Round Handle are snap type sucker rod wrenches. The snap feature will eliminate hammering of couplings.

No. 106—Safety sucker rod elevator is made of graded heat treated steel. The main feature of this elevator is that it will surround the rod and prevent tipping of the elevator.

No. 122—Tubing block clamp is quick and safe, when hoisting tubing block to the crown block to connect the lines for hoisting.

No. 8, No. 50, No. 7, No. 2 Heavy, No. 83 Wedge Type Grip are well known grips in all oil fields. No. 2 Heavy with square head screw is very practical on Jack Wells.

No. 22—Carrier bar is used in connection with all grips.

No. 82—Safety sucker rod elevators are front latch type elevators.

No. 92—Round handle tubing tong is made of graded steel and is so designed that the one handle will take 2", 2½", or 3" Jaws.

No. 6-5—Wire Line Clamp and No. 6-4 Babbitt Socket are used for connecting wire lines to the No. 8 Grip or No. 22 Carrier Bar, when in pumping operation.

No. 28—Bell Nipples are made in three sizes: 2", 2½", and 3".

No. 31—Articulation de tubage à pivot à ressort est employée au lieu d'un crochet de tubage. Capacité de 150.000 lbs.

No. 89—Articulation de tubage à pivot à ressort avec addition de poids s'emploie pour descendre les câbles de tiges aspiratrices. Capacité de 150.000 lbs.

No. 85—Chaise de tige aspiratrice avec crochet à pivot sur roulement à billes, très pratique et très sûre. Elle est prévue avec tout nombre désiré de supports de 1 à 100.

No. 91—Crochet de tige aspiratrice de sûreté à ressort. Le ressort a pour but de retirer un support de dessus la boîte une fois dévissé et aide aussi à maintenir les tiges droites quand on tourne les tiges à la clé. Capacité de 90.000 lbs.

No. 14-B—Ces articulations "C" sont faites en 3 tailles, capacité du No. 14-A 60.000 lbs.; du No. 14-B 100.000 lbs.; du No. 14-C 150.000 lbs.

No. 102—Le poids de câble de tige aspiratrice a des doubles étriers à pivot sur roulement à billes et pèse 100 lbs. Il est creux et prévu pour recevoir du poids additionnel jusqu'à 400 lbs.

No. 60-B—à levier plat, No. 60-A à levier rallonge; No. 60-H à levier rond sont des clés à tiges aspiratrices du type à enclenchement, ce qui supprime le martelage des raccords.

No. 106—Elévateur de tiges aspiratrices de sûreté en acier à traitement thermique gradué. Son principal avantage réside dans le fait qu'il entoure la tige et empêche le basculage de l'élévateur.

No. 122—Bride de bloc de tubage rapide et sûre lors du levage du bloc de tubage jusqu'au bloc de couronne aux fins de relier les câbles pour le levage.

No. 8, No. 50, No. 7, No. 2 type fort, No. 83 type à cale de poignées sont des poignées bien connues sur tous les champs de pétrole. Le type fort No. 2 avec vis à tête carrée est très pratique sur puits à balancier.

No. 22—Barre de support s'emploie en rapport avec toutes les poignées.

No. 82—Ces élévateurs de tiges aspiratrices de sûreté sont des élévateurs du type à loquet sur le devant.

No. 92—Cette pince de tubage à levier rond est en acier gradué et est d'un tracé tel que ce seul levier pourra recevoir des mâchoires de 2, 2½ ou 3 pouces.

No. 6-5—Cette bride de fixation de câbles et la douille à régule No. 6-4 sont employées pour relier les câbles à la poignée No. 8 ou la barre de support No. 22 en service de pompage.

No. 28—Ces raccords à cloche sont prévus en trois tailles: 2, 2½ et 3 pouces.

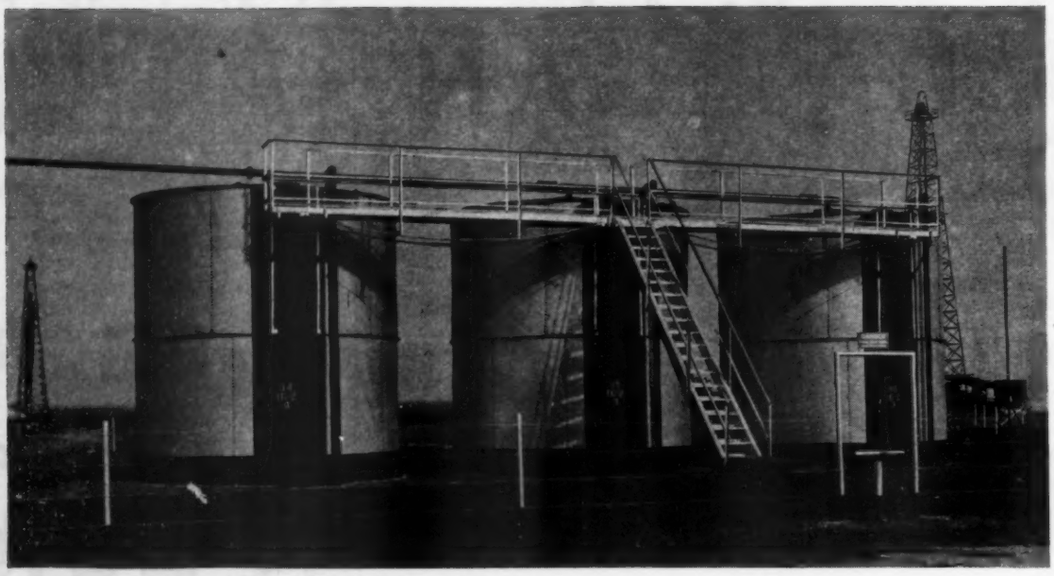
Todas las herramientas aquí ilustradas y muchas otras de marca Ratigan aparecen descritas en detalle y con sus precios en nuestro catálogo, ejemplar del cual enviaremos gustosamente a solicitud.

All of these illustrations and many other Ratigan tools are described and priced in our catalog, which will be sent on application.

Tous les outils Ratigan représentés ici et bien d'autres sont décrits et cotés dans notre catalogue, qui sera fourni sur demande.

MALONEY TANK MFG. COMPANY

38 N. Peoria, Tulsa, Okla., U. S. A.



Maloney 500-Bbl. Galvanized Bolted Steel Tanks, Walkway and Stairway

MALONEY TANKS, STAIRWAYS AND WALKWAYS

MALONEY originated, designed and built the world's first bolted steel tank,—in 1912, and lone-handed launched the bolted steel tank industry. Today the use of bolted steel tanks in the oil fields has become universal, and the industry world-wide in scope—yet MALONEY has consistently maintained its position as the outstanding specialist in this field. MALONEY Tanks, Walkways, and tank accessories have been constantly improved and today approach perfection in every detail as well as offering some advantages which are strictly exclusive.

Among the advantages of MALONEY Tanks are construction of Blue Annealed Copper Steel; MALONEY patented "crimp" at all seams and joints, insuring accurate fit of parts; durable cloth-inserted red rubber packing; special tank bolts of 90,000-lbs. tensile strength; large 30" x 48" clean-out plate; all-aluminum non-spark vacuum-pressure valve, 8"x18", with shelf for thief inside.

Tanks are painted with our red Chromated Iron Oxide primer and our heavy Aluminum Finish Coat for exteriors. All material cleaned before application of paint.

Stairways and Walkways

The MALONEY self-supporting, sectional steel Stairway and Walkway we offer as the strongest, simplest, most easily erected product in its field. Standard 4, 6 and 8-foot units render it possible to construct any combination of stairways and walkways that may be required. Walkway units are welded at corners, and cross-supports are welded beneath tread every 2 feet. Strictly non-sagging. Improved non-skid tread.

Galvanized, if Desired

MALONEY Tanks and Walkways and Stairways may be ordered with heavy, "hot-dip" galvanized coating, if desired. Standard MALONEY Tanks, Walkways and Stairways are galvanized with pure zinc by the superior "double-hot-dip" process, AFTER FABRICATION.

Export Service

Tank capacities 100 to 10,000 bbls. Export shipments are sturdily packed in steel-bound crates conforming to customs regulations of countries to which shipped. Export Offices: Lucey Export Corp., 3505 Woolworth Bldg., New York; Rose Lloyd & Co., Ltd., London.

MALONEY TANQUES, ESCALERAS Y PASILLOS

La MALONEY fué una de las primeras en construir tanques de acero empernados, en 1912 y desde entonces se ha dedicado con especialidad a la fabricación y refinamiento de este tipo de tanque y sus accesorios. Hoy día, los tanques, los pasillos, las escaleras y otros acesorios de marca MALONEY son los más perfectos en todo detalle, ofreciendo numerosas ventajas exclusivas.

Entre las ventajas de los tanques MALONEY se incluyen su construcción de acero cúpricó Keystone; "ondulación" patentada en todas las costuras y uniones para asegurar ajuste exacto a las piezas; sostén de cubierta de acero grueso; durable empaquetadura de caucho rojo insertada en tela; pernos especiales con resistencia de tensión de 90.000 libras; placa grande de limpieza de 30" x 48"; válvula de presión al vacío "sin chispa" con anaquel interior para dispositivo indicador.

Nuestra pintura roja de óxido de hierro cromado, de gran resistencia a la corrosión, se usa en el interior y como capa de imprimación en el exterior. La capa de acabado para el exterior es fina pintura de aluminio.

Escaleras y pasillos

La escalera y pasillo MALONEY de soporte propio, de construcción seccional de acero, representan lo más firme, sencillo y fácil de instalar de su clase en el mercado. Mediante secciones normales de 4, de 6 y de 8 pies es posible formar cualquiera combinación de escaleras y pasillos que se quiera. Los escalones o peldaños están soldados en las esquinas y los soportes transversales están soldados cada dos pies debajo del escalón. Es una construcción segura que no puede ceder o deformarse. Escalones antideslizantes de tipo perfeccionado.

Galvanizado, si se quiere

Los tanques y los pasillos MALONEY pueden también pedirse con gruesa capa galvanizada en caliente. Los tanques normales MALONEY se galvanizan con puro zinc por el excelente procedimiento de "doble inmersión" al calor, DESPUES DE LA FABRICACION, lo que asegura completa galvanización de todos los bordes y agujeros de pernos. Nuestros pernos especiales con resistencia de tensión de 90.000 libras se galvanizan también en baño caliente. Esta galvanización les imparte protección máxima contra el enmohecimiento o corrosión.

Servicio de exportación

Tanques en capacidades de 100 a 10.000 barriles. Los embarques de exportación se empacan muy bien en firmes huacales reforzados con bandas de acero o precintas, de acuerdo con las regulaciones aduanales de los países a que vayan consignados. Oficinas de exportación: Lucey Export Corp., 3505 Woolworth Bldg., Nueva York, N. Y., E. U. A.; Rose Lloyd & Co., Ltd., Londres, Inglaterra.

MALONEY RESERVOIRS, ESCALIERS ET PASSAGES

MALONEY a été un pionnier dans la construction du réservoir boulonné en acier, dès 1912, et s'est spécialisé depuis lors dans la fabrication et le perfectionnement de ce type de réservoir et de ses accessoires. A l'heure actuelle, les Réservoirs, Passages et accessoires MALONEY approchent de la perfection dans le moindre détail, offrant un bon nombre d'avantages exclusifs à la marque.

Parmi les avantages des réservoirs MALONEY, on peut citer: sa construction d'acier cuprifère Keystone; le "sertissement" breveté à tous les joints et soudures, pour ajustage impeccable des pièces; poutrelle de pont en acier de fort calibre; garniture durable en caoutchouc rouge avec intercalation de toile: boulons spéciaux d'une résistance à la traction de 90.000 lbs.; grande plaque pour le nettoyage mesurant 30 pouces sur 48 pouces; soupape d'aluminium non-étincelle à pression de vide avec à l'intérieur un rayon pour dispositif carottier.

Notre peinture rouge chromatée à base d'oxyde de fer, d'une grande résistance à la corrosion, est employée sur les surfaces intérieures, et comme couche de base sur les surfaces extérieures. La couche de fini appliquée sur les surfaces extérieures est une qualité supérieure de peinture à l'aluminium.

Escaliers et Passages

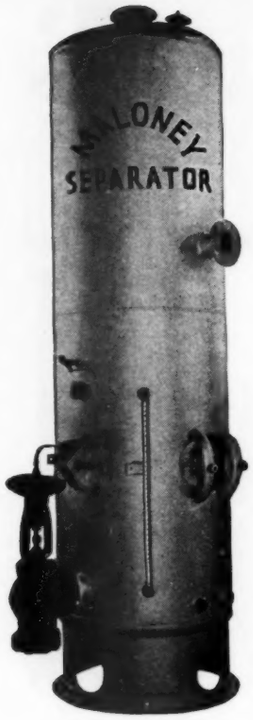
Nous offrons l'escalier et passage MALONEY en acier, sectionnel et se tenant seul, comme étant la structure la plus robuste, la plus simple et la plus facile à installer qui soit offerte dans la branche. Des unités standards de 4, 6 et 8 pieds permettent de construire toute combinaison imaginable d'escaliers et de passages selon les besoins particuliers de l'usager. Des plaques protectrices sont soudées aux coins, et des supports transversaux sont fixés par soudage en-dessous de la plaque protectrice tous les 2 pieds. Rigoureusement non susceptible de s'affaisser. Plaque de protection anti-dérapante perfectionnée.

Galvanisé, si on le désire

Si on le désire, on peut obtenir les réservoirs et passages MALONEY recouverts d'une forte couche galvanisée, obtenue par "trempage à chaud." Les réservoirs standards MALONEY sont galvanisés au zinc pur au moyen du procédé supérieur du "double trempage à chaud," APRES FABRICATION, ce qui assure que tous les bords, y compris les trous de boulons, sont bien galvanisés. Nos boulons de résistance 90.000 lbs. sont aussi galvanisés par trempage à chaud. Ce trempage assure une protection maximum contre la corrosion.

Service d'exportation

Capacités de réservoir allant de 100 à 10.000 barils. Les expéditions d'exportation sont faites dans un emballage solide, en caisses à claire-voie cerclés de fer, se conformant aux exigences douanières des pays de destination. Bureaux d'exportation: Lucey Export Corp., 3505 Woolworth Bldg., New-York; Rose Lloyd & Co., Ltd., London.



MALONEY SEPARATORS

The MALONEY Oil and Gas Separator, recently introduced, is heavily built for efficient and economical service, and offers a number of new and important improvements. Among these are increased capacity of the initial chamber, providing higher vertical travel for gases before entering Knock-Out Element, and Mist Traps of improved design which remove all oil and allow only dry gas to pass out of the separator. Knock-Out Element and Mist Traps are fully patented. Valve equipment is the latest and best. Boiler-type manhole plates, held by two bolts, are far superior to old type plates. MALONEY Separators conform in full to the code requirements of the A.P.I. and the A.S.M.E.

SEPARADORES MALONEY

El separador de petróleo y de gas MALONEY, recientemente introducido al mercado, es de firme construcción y de servicio muy eficaz y económico, ofreciendo al mismo tiempo, varias innovaciones importantes. Entre estas innovaciones se incluyen la mayor capacidad de la cámara inicial, para asegurar a los gases una mayor carrera vertical antes de entrar en el elemento extractor, y los colectores de vapor de tipo perfeccionado, que separan todo el petróleo y permiten que sólo el gas seco salga del separador. El elemento extractor y los colectores de vapor están amparados por patentes. El equipo de válvulas es la última palabra en el ramo. Las placas de orificio de inspección de tipo de caldera, aseguradas por dos pernos, son superiores a las del antiguo tipo. Los separadores MALONEY se conforman, en todo sentido, con las especificaciones del código de la A.P.I. y de la A.S.M.E.

SEPARATEURS MALONEY

Le séparateur de pétrole et de gaz MALONEY, de date récente, est de construction robuste et de service efficace et économique; en outre il offre plusieurs progrès nouveaux et décisifs. Citons entre autres la capacité accrue de la chambre initiale, ce qui offre une plus longue course verticale des gaz avant d'entrer dans l'élément extracteur, et des collecteurs de brouillards de tracé perfectionné qui retiennent tout le pétrole et ne laissent sortir du séparateur que des gaz secs. L'élément extracteur et les collecteurs de brouillards font l'objet de brevets complets. Tout dernier système de vannes supérieur. Emploi de plaques de trous d'homme du type de chaudière, maintenues par deux boulons, très supérieures à l'ancien type. Les séparateurs MALONEY sont tout à fait conformes aux spécifications de code de A.P.I. et de la A.S.M.E.

★GREEN HEAD PRODUCTS

MAKES DRILLING EASIER . . . MORE PROFITABLE

GREEN HEAD 3-WAY BIT . . . Made with extra long blades which are faced and inserted with the best hard surfacing materials available. There is one or two circulating holes on each blade as desired, each inserted with special hard metal, replaceable bushings of sufficient size to provide the correct amount of fluid on each blade.

TREPAN A 3 LAMES GREEN HEAD . . . Prévu avec lames extra-longues qui sont dressées et rapportées avec les meilleures matières de surfaçage dur obtenables. Il y a un ou deux trous de circulation sur chaque lame au choix, qu'on a garnis de coussinets amovibles, en métal dur spécial, de taille suffisante pour assurer la quantité juste de fluide sur chaque lame.

TREPAN A 6 LAMES GREEN HEAD . . . Pour un forage plus rapide et plus rectiligne, faites emploi d'un trépan à 6 lames Green Head. Les 3 lames-guides et les 3 lames d'alésage extra-longues rompent vite l'entaille. Les trépans sont dressés avec la meilleure matière de surfaçage dur obtenable.

ECHELLE DE CABLE GREEN HEAD . . . Est utile pour forer des trous plus droits en mener à bonne fin des forages et des repêchages difficiles. Donne la charge exacte sur le câble à tout moment. N'est pas affecté par les intempéries—pas de liquide pouvant fuir ou geler. Il en est prévu 5 types pour forage de diverses profondeurs, avec ou sans organe enregistreur.

SOUPAGE DE SURETE DE CONTRE-PRESSION . . . Assure un joint parfait contre la contre-pression—de fonctionnement automatique. Simple de construction. Prévue avec siège remplaçable et clapet avec garniture intérieure en caoutchouc à l'épreuve des abrasifs. Réalise une plus grande sécurité d'où pour vous économie d'argent!

BARRENA DE 3 LAMINAS GREEN HEAD . . . Se hace con láminas bien largas, las cuales llevan revestimiento e inserciones de los mejores materiales para el endurecimiento de la superficie. En cada lámina hay uno o dos agujeros de circulación, como se indique, cada uno provisto de buje amovible, insertado, de metal muy duro, y de suficiente tamaño para asegurar el paso de la correcta cantidad de líquido por cada lámina.

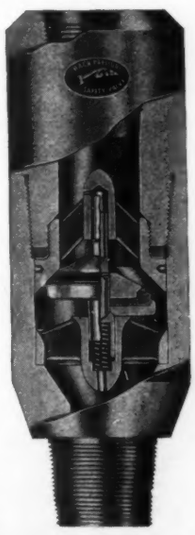
BARRENA DE 6 LAMINAS GREEN HEAD . . . Para perforación más rápida y más rectilínea, empléese una barrena de 6 láminas Green Head. Las 3 láminas guiadoras y las 3 láminas cortadoras extra largas, hacen el agujero con rapidez y facilidad. Las barrenas están revestidas con la mejor clase de material duro de revestimiento del mercado.

ESCALA DE CABLE GREEN HEAD . . . Para perforar agujeros más rectos y completar difíciles trabajos de perforación y pesca. Indica la carga exacta del cable en todo momento. No es afectada por las variaciones del tiempo—no hay líquido expuesto a escaparse o congelarse. Cinco tipos, para perforación de diversas profundidades, con mecanismo de registro o sin él.

VALVULA DE SEGURIDAD DE CONTRAPRESION . . . Asegura un cierre perfecto contra la contrapresión—funciona automáticamente. Construcción sencilla. Se hace con asiento reemplazable y la válvula va provista de una pieza de caucho insertada de gran resistencia al desgaste. Por su mayor seguridad, ahorra muchos gastos.

GREEN HEAD 6-WAY BIT . . . For faster drilling and straighter hole, use a Green Head 6-Way Bit. The 3 pilot blades and 3 extra long reaming blades break up the cut quickly. Bits are faced with the best hard surfacing material available.

GREEN HEAD LINE SCALE . . . For drilling straighter holes and completing difficult drilling and fishing jobs. Gives the exact load on the line at all times. Not affected by weather variations—no fluid to leak or freeze. Five types designed for deep or shallow drilling, with or without a recording unit.



BACK PRESSURE SAFETY VALVE . . . Assures a perfect seal against back pressure—operates automatically. Simple in construction. Made with replaceable seat and valve with abrasive resisting rubber insert. Effects greater safety which saves you money!

GREEN HEAD
BIT AND SUPPLY CO.

(Formerly Snetcher & Pittman)

Oklahoma City, Oklahoma; Houston, Odessa, Corpus Christi, Texas; Scott, Louisiana.

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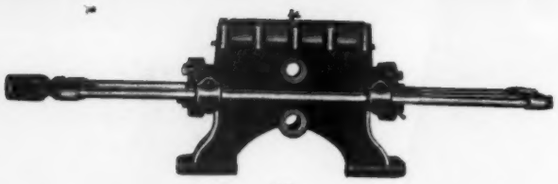
GASO PUMP & BURNER MFG.



301

PISTON POWER PUMPS

GASO Piston Power Pumps have been used by the large pipe line companies for the past 25 years and have proven highly successful as high duty pumps. While heavily constructed to withstand the high pressures of main pipe lines which usually exceed 600 pounds per square inch, they are equally suitable for lease or other low-pressure work around refineries or pumping stations. Double acting, with inside packed cup piston. Regular fittings: Steel piston rods, brass cylinder liner, brass screwed seats, brass valves, cages and springs. Cylinder diameters 3 to 5 inches; capacities, 31.73 to 157.36 barrels per hour.

POMPES MECANIQUES A PISTON

Les pompes mécaniques à piston GASO sont utilisées par les grandes compagnies de pipelines depuis 25 ans et se sont montrées des plus satisfaisantes comme pompes de service dur. Bien que prévues robustes pour résister aux fortes pressions des canalisations principales en général de plus de 600 lbs. par pouce carré, elles sont tout aussi indiquées sur les concessions ou pour tout autre usage de faible pression auprès des raffineries ou des stations de pompage. A double effet, avec piston à cuvette garni à l'intérieur. Garnitures habituelles: tiges de piston en acier, sièges vissés en laiton, soupapes, cages et ressorts en laiton. Diamètres de cylindre 3 à 5 pouces; débits 31,73 à 157.36 barils à l'heure.

BOMBA MECANICA DE EMBOLO

Las bombas mecánicas de émbolo GASO se han utilizado por las grandes compañías de transporte por sistemas de tubería, desde hace 25 años, y en todo caso han dado resultados muy satisfactorios como bombas de trabajo pesado. A pesar de que por su firme construcción se adaptan idealmente a las grandes presiones de los sistemas de tuberías conductoras, que por lo general, pasan de 600 libras por pulgada cuadrada, resultan, sin embargo, igualmente adecuadas a servicio en concesiones y otros trabajos de baja presión en refinerías y estaciones de bombeo. Son modelos de doble efecto, con taza de émbolo provista de empaquetadura interior. Conexiones normales; varillas de émbolo de acero, manguito o camisa de latón en el cilindro, asientos de latón atornillados, válvulas, jaulas y resortes de latón. Diámetros de cilindro de 3 a 5 pulgadas; capacidades de 31,73 a 157,36 barriles por hora.

201

RODLINE PUMP

This is a general service pump designed for use in connection with the rod or shackle line between the power and well, or it can be connected to the power direct with a pitman. Many users connect this pump to rodline and use a weight to pull back the plunger. This pump is an outside packed plunger type. Plunger is made of semi-steel and works in a smooth-bored cast iron barrel. Pump is very simple, easily handled and repaired. Has brass valves, brass screwed seats, brass valve springs and cages. Made in one size only, cylinder diameter 3¼", capacity 30.96 to 41.28 barrels per hour, depending on speed of operation.

POMPE A LIGNE DE TIGES

C'est une pompe de service général prévue pour emploi en relation avec la ligne de tiges ou jumelles entre le groupe-moteur et le puits, ou on peut la relier à ce groupe directement avec une biella de connexion. Bon nombre d'usagers relient cette pompe à la ligne de tiges et emploient un poids pour tirer le plongeur en arrière. Cette pompe est un type à plongeur à bourrage extérieur. Le plongeur est en acier usiné et fonctionne dans un corps en fonte à forage lisse. Pompe très simple, facile à manoeuvre et à réparer. Elle a des soupapes de laiton, des sièges vissés en laiton, des ressorts de soupape et cages en laiton. Prévue d'une seule taille, de diamètre de cylindre de 3¼ pouces, d'un débit de 30,96 à 41,28 barils à l'heure variant avec la vitesse de marche.

BOMBA DE LINEA DE VARILLAS

Esta es una bomba para servicio general, que se emplea en conexión con la línea de varillas o gemelos, entre el grupo motor y el pozo, o puede conectarse directamente al grupo motor mediante una biela de conexión. Muchos dueños conectan esta bomba a la línea de varillas y emplean un peso para retraer el buzo. Esta bomba es un tipo de buzo con empaquetadura exterior. El buzo es de semi-acero y funciona en un cilindro de hierro fundido muy bien alisado. La bomba es muy sencilla, muy fácil de manejar y de reparar. Tiene válvulas de latón, asientos atornillados de latón, resortes y jaulas de válvula de latón. Se ofrece en un solo tamaño, con cilindro de 3¼" de diámetro; capacidad de 30,96 a 41,28 barriles por hora, dependiendo de la velocidad de la operación.

601

WALKING BEAM PUMPS

These pumps are intended for use on leases where no power is available and are connected direct to the walking beam by means of the pitman.

Figure 601 is for oil or water. This pump has a long stroke in order to set far enough out on the main sill to clear the Samson post brace and give a straight line pull. Regular fittings include: Brass liner, brass valves, seats and springs, steel piston rod, cast iron piston bodies with cast iron snap piston rings. Capacities 30.30 to 55.10 bbls. per hour.

Figures 604 and 604½ are gas and vacuum pumps in vertical and horizontal types. These pumps are used in taking gas from the well or to put vacuum on the well, and are connected either to the walking beam by means of the pitman, or to surface rods on a pumping well. They are sturdily constructed. Cylinders are of gray cast iron. Pistons consist of head and follower with two heavy piston rings supported by an expansion ring which is expanded by means of four adjusting springs to insure a perfect fit at all times. Valve pots are cast separately from main frame and are equipped with brass winged valves with leather faces. Piston rods are of turned and polished steel shafting. Castings are furnished for beam and power connections. Cylinder diameters, 14 to 20 inches; points vacuum 26 to 28.

POMPES A CULBUTEUR

Ces pompes sont prévues pour emploi sur les concessions où l'on n'a pas de force motrice et sont reliées directement au culbuteur au moyen d'une bielle de connexion.

Le modèle de la figura 601 est pour pétrole ou eau. Cette pompe a une longue course afin de refouler assez loin dehors sur le brancard et éviter le renfort de montant Samson tout en donnant une traction en ligne droite. Garnitures habituelles: Fourreau de laiton, soupapes, sièges et ressorts en laiton, tige de piston en acier, corps de piston en fonte avec segments de piston en fonte à déclic. Débits 30,30 à 55,10 barils à l'heure.

Les figures 604 et 604½ sont des pompes à gaz et à vide de types vertical et horizontal. On les emploi soit pour extraire du gaz du puits, soit pour faire du vide dans le puits, et on les relie soit au culbuteur au moyen de la bielle de connexion, soit aux tiges de surface sur un puits de pompage. Elles sont de construction robuste. Les cylindres en sont de fonte grise. Les pistons consistent de culasse et poussoir avec deux forts segments de piston soutenus par une bague extensible qui se dilate au moyen de 4 ressorts de réglage assurant un ajustage parfait à tout moment. Les boîtiers de soupapes sont coulés séparément du bâti principal et équipés de clapets ailés en laiton avec garnitures de cuir. Les tiges de piston sont en barre d'acier touné et poli. Pièces coulées fournies pour raccords de culbuteur et de force motrice. Diamètres de cylindre, 14 à 20 pouces; points de vide 26 à 28.

604

BOMBAS DE BALANCIN

Estas bombas sirven para trabajo en concesiones donde no hay fuerza motriz y se conectan directamente al balancín por medio de una biela de conexión.

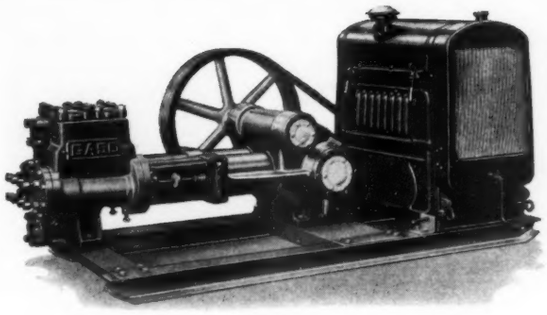
El modelo de la figura 601 es para petróleo o agua. Esta bomba tiene una carrera larga, para poder apartarse bastante de la solera principal y pasar por el refuerzo del soporte del balancín, a fin de dar una tracción en línea recta. Entre las guarniciones corrientes se incluyen: manguito o camisa de latón, válvulas, asientos y resortes de latón, varilla de acero para el émbolo, cuerpos de émbolo de hierro fundido con anillos de émbolo de presión de hierro fundido. Capacidades de 30,30 a 55,10 barriles por hora.

Los modelos mostrados en las figuras 604 y 604½ son bombas de gas y de vacío, en tipos verticales y horizontales. Estas bombas se emplean para extraer el gas del pozo o para establecer vacío en el pozo, y se conectan con el balancín, mediante una biela de conexión, o con varilla de superficie en un pozo de bombeo. Son de muy firme construcción. Los cilindros son de hierro fundido gris. Los émbolos constan de culata y cuerpo con dos grandes anillos de émbolo soportados por un anillo de extensión, el cual, por su parte, se extiende por medio de cuatro resortes de ajuste, para asegurar un ajuste perfecto en todo momento. Las cajas de las válvulas están fundidas separadamente del cuerpo principal. Las válvulas son del tipo de aleta, hechas de latón, con empaquetaduras de cuero. Las varillas del émbolo son de barra de acero torneada y pulida. Se suministran piezas fundidas para las conexiones del balancín y de la fuerza motríz. Diámetros del cilindro, de 14 a 28 pulgadas; puntos de vacío de 26 a 28.

604½

Export Office: 149 Broadway, New York, N. Y.——*Bureaux d'exportation:* 146 Broadway, New-York, N.Y.

COMPANY, TULSA, OKLA., U. S. A.



1844

SERIES 1800 — POWER PUMPS

GASO Figure 1844 Pump is adaptable for any service such as water lines, gathering systems, booster stations, or acidizing. Light in weight, compact and complete, it is ideal to meet conditions in declining fields or on smaller leases. Pump is illustrated with both gas or gasoline engine, and motor drive.

The same features will be found in this pump as in models of much higher price. Crankcase is enclosed and provides a reservoir for holding oil bath which lubricates the gears, crossheads and connecting rod bearings. Main and pinion bearings are Timken Tapered Roller Bearings, enclosed in cast iron housings and sealed off from crankcase. Timken bearings are oiled from outside, one filling sufficing for months of steady operation.

Fluid ends are interchangeable liner type. We can furnish special alloy steel liners or bronze liners for specific service; also all-acid-resisting-bronze fluid end for acid service. Pump can be arranged for any type drive. Cylinder sizes 2½x6 to 6x6; capacities 46 to 288 barrels per hour.

POMPES MECANIQUES—SERIE 1800

La pompe GASO de la figure 1844 est adaptable à tout service tel que pour conduites d'eau, systèmes collecteurs, stations de secours, ou traitement acide. De poids léger, compacte et complète, elle est idéale pour les champs déclinants ou sur les petites concessions. La pompe est représentée avec tant moteur à gaz qu'à essence, et commande de moteur.

On trouve sur cette pompe les mêmes caractéristiques que sur des modèles beaucoup plus chers. Le carter en est fermé et fournit un réservoir pour contenir le bain d'huile qui graisse les engrenages, les croisillons et les paliers de bielles. Les paliers de vilebrequin et de pignons sont des paliers Timken à rouleaux coniques, enfermés dans des boîtiers en fonte et isolés du carter. Les paliers Timken sont huilés de l'extérieur, un remplissage suffisant pour des mois de marche régulière.

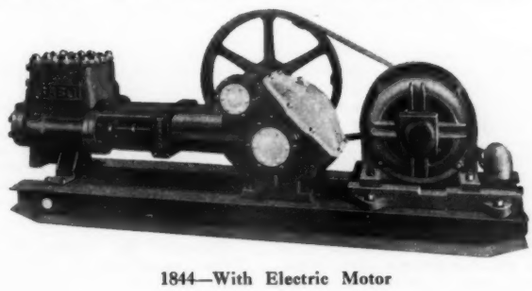
Les bouts à liquide sont du type à fourreau interchangeable. Nous pouvons fournir des fourreaux en acier spécial ou en bronze pour service spécial; aussi un bout à liquide tout en bronze anti-acide pour service à acides. On peut prévoir la pompe pour tout type de commande. Grandeurs de cylindre 2½ x 6 à 6 x 6; débits de 46 à 288 barils à l'heure.

BOMBAS MECANICAS—SERIE 1800

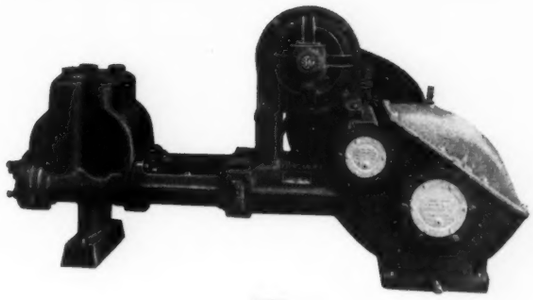
La bomba GASO, según la figura 1844, se adapta a cualquier servicio, como conductos de agua, sistemas colectores, estaciones de amplificación y trabajos de tratamiento por ácido. Liviana en peso, compacta y completa, resulta ideal para los campos en declinación o las pequeñas concesiones. La bomba está ilustrada tanto con motor de gas como con motor de gasolina y propulsión de motor.

En esta bomba se presentan las mismas características que se ofrecen con los modelos más caros. La caja del cigüeñal está cerrada y provee un depósito para un baño de aceite, que sirve para lubricar los engranajes, cabezales y cojinetes de bielas. Los cojinetes del cigüeñal y de los piñones son de rodillos cónicos Timken, protegidos en cajas de hierro fundido y aislados de la caja del cigüeñal. Los cojinetes Timken reciben lubricación exterior, bastando una carga de lubricante para varios meses de contínuo trabajo.

Los extremos de líquido son del tipo de manguito o camisa intercambiable. Podemos suministrar manguitos de especial aleación de acero o manguitos de bronce, para servicios especiales; también ofrecemos extremos de líquido de bronce resistente al ácido, para trabajos de ácido. La bomba puede acondicionarse a cualquier tipo de propulsión. Tamaños de cilindro de 2½ x 6 a 6 x 6 pulgadas; capacidades de 46 a 288 barriles por hora.



1844—With Electric Motor



1509

SERIES 1500 — POWER PUMPS

GASO Figure 1509 Pump, here shown, is designed to pump oil or water under pressures of from 150 to 1000 pounds.

Outstanding features of this model are its enclosed crankcase, with all working parts operating in a bath of oil, and its main gear of herringbone design, a semi-steel casting mounted in the center on a heavy steel crankshaft, to evenly distribute load on the bearings. Pinion is a steel forging and is also mounted at the center of pinion shaft.

Main and pinion bearings are Timken Tapered Roller Type, enclosed in cast iron housings. Connecting rod bearing is a steel shell, genuine babbitt lined, and can be replaced.

The fluid end can be furnished with cast iron removable liners or with bronze-lined liners of removable type. Fluid ends for Figs. 1507 and 1508, also 2017, 2018 and 2019, are interchangeable on this power frame. Fig. 1509 is here shown with valve pot type fluid end, interchangeable liner type.

Pumps can be arranged for any type drive: (1) Pulley for belt drive, (2) direct connected to engine through flexible coupling, (3) electric motor through chain or reduction gears, (4) "V" Belt drive to electric motor or multiple cylinder power unit.

Cylinder sizes 2½x10 to 7x10; Capacities 59 to 508 barrels per hour.

POMPES MECANIQUES—SERIE 1500

La pompe GASO de la figure 1509, représentée ici, est prévue pour pomper le pétrole ou l'eau sous des pressions allant de 150 à 1000 lbs.

Les principales caractéristiques de ce modèle sont: son carter clos, avec toutes les pièces mobiles travaillant dans un bain d'huile et son engrenage moteur à chevrons, une pièce coulée en acier usiné montée au centre sur un vilebrequin de fort acier, afin de répartir la charge également sur les paliers. Le pignon est une pièce forgée en acier et est aussi monté au centre de l'arbre à pignon.

Les paliers moteur et de pignons sont du type à rouleau conique Timken, enfermés dans des boîtiers de fonte. Le palier de bielle est un corps d'acier, à régule véritable, et peut être remplacé.

Le bout à liquide peut être fourni avec fourreaux amovibles en fonte ou avec fourreaux à revêtement de bronze du type amovible. Les bouts à liquide des Figs. 1507 et 1508, aussi 2017, 2018 et 2019 sont interchangeables sur ce bâti moteur. La Fig. 1509 est représentée ici avec bout à liquide du type à boîtier de soupape, type de fourreaux interchangeable.

Les pompes peuvent être prévues pour tout genre de commande: (1) Poulie pour entraînement par courroie, (2) liaison directe au moteur par accouplement flexible, (3) moteur électrique par engrenages à chaînes ou à réduction, (4) transmission à courroie en "V" avec le moteur électrique ou groupe-force multi-cylindre.

Tailles de cylindre: 2½ x 10 à 7 x 10; débits de 59 à 508 barils à l'heure.

BOMBAS MECANICAS—SERIE 1500

La bomba GASO ilustrada en la figura 1509 sirve para bombear petróleo o agua bajo presiones de 150 a 1000 libras.

Las ventajas sobresalientes de este modelo son su caja de cigüeñal cerrada, con todas las piezas móviles funcionando en un baño de aceite, y su engranaje principal de tipo de espiga de pescado, más una pieza fundida de semiacero montada en el centro, en un cigüeñal grueso de acero, para distribuir uniformemente el peso entre los cojinetes. El piñón es de acero forjado y está montado al centro del árbol del piñón.

Los cojinetes del cigüeñal y del piñón son Timken de rodillos cónicos, quedando encerrados en cajas de hierro fundido. El cojinete de la biela es de acero con forro de metal babbitt, de tipo reemplazable.

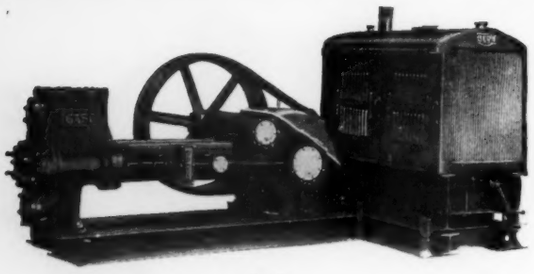
El extremo de líquido puede suministrarse con manguitos reemplazables de hierro fundido o con manguitos o camisas reemplazables de bronce. Los extremos de líquido para los modelos 1507 y 1508, y también de los modelos 2017, 2018 y 2019, pueden intercambiarse en este bastidor de motor. El modelo de la figura 1509 está representado aquí con extremo de líquido del tipo de caja de válvula y manguito de tipo intercambiable.

Las bombas pueden prepararse para cualquier tipo de propulsión: (1) Polea para transmisión por correa; (2) conexión directa al motor mediante acoplamiento flexible; (3) motor eléctrico, mediante cadena o mecanismo de engranajes de reducción; (4) propulsión por cadena en V a motor eléctrico o motor multicilíndrico.

Tamaños del cilindro, de 2½ x 10 a 7 x 10 pulgadas. Capacidades de 59 a 508 barriles por hora.

Oficina de exportación: 149 Broadway, Nueva York, N.Y., E.U.A.

GASO PUMP & BURNER MFG.



1740

SERIES 1700 — POWER PUMPS

These pumps are designed to pump oil or water through long lines at pressures from 300 to 1400 pounds. Are admirably suited for pumping extremely large capacities at high pressures, having fluid ends with interchangeable liners from 2½" to 5" and from 5" to 7" x 10" stroke. Figure 1740 shows the pump with Combination Gas and Gasoline Engine drive, Figure 1741, with Diesel Engine Drive, and 1742, with Motor Drive.

These pumps possess all of the recognized GASO features. Crankcase is fully enclosed, and working parts operate in oil bath. Both pinion and crankshafts are journaled in Timken Tapered Roller Bearings of exceptionally large size and sealed off from the crankcase. Fluid ends can be furnished with special alloy steel liners, chromonized, or cast iron liners, bronze lined. All pumps are standard brass fitted, with steel piston rods. We can furnish any type of valve construction required for particular conditions. Pumps can be arranged for any type drive: (1) Pulley for belt drive, (2) direct connected to engine through flexible coupling, (2) electric motor through chain or reduction gears, (4) "V" Belt drive to electric motor or multiple cylinder power unit. Capacities 54 to 502 barrels per hour.

POMPES MECANIQUES—SERIE 1700

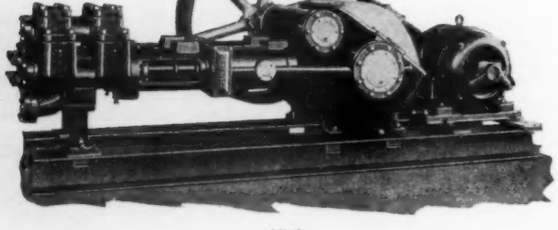
Ces pompes sont prévues pour pomper l'huile ou l'eau à travers de longues conduites à des pressions allant de 300 à 1400 lbs. Elles sont l'idéal pour pomper des débits très forts sous fortes pressions, car elles sont munies de bouts à liquide avec fourreaux interchangeables de 2½ à 5 pouces et de course de 5 à 7 x 10 pouces. La figure 1740 représente la pompe avec commande à moteur combinaison à gaz et à essence, la figure 1741 avec commande par moteur Diesel, et 1742 avec commande à moteur.

Ces pompes ont toutes les caractéristiques GASO reconnues. Le carter en est tout fermé, et les pièces mobiles en fonctionnent dans un bain d'huile. Tant arbres de pignons que de vilebrequin sont sur paliers à rouleaux coniques Timken de très forte taille et isolés du carter. Les bouts à liquide peuvent être fournis avec fourreaux en acier spécial, chromonisés, ou avec fourreaux en fonte, revêtus de bronze. Toutes les pompes sont avec garnitures de bronze standard et tiges de piston en acier. Nous pouvons fournir tout type de construction de soupapes selon les conditions d'emploi spéciales en vue. Les pompes peuvent être prévues pour tout type de commande: (1) Poulie pour commande par courroie, (2) liaison directe au moteur par accouplements flexibles, (3) moteur électrique par engrenages à chaînes ou à réduction, (4) transmission à courroie en "V" avec le moteur électrique ou groupe-force multi-cylindre. Débits de 54 à 502 barils à l'heure.

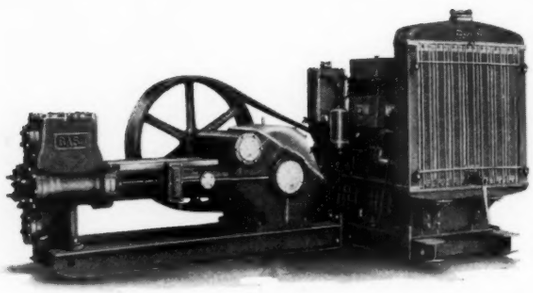
BOMBAS MECANICAS—SERIE 1700

Estas bombas sirven para bombear agua o petróleo, a través de largas tuberías, a presiones de 300 a 1400 libras. Se adaptan admirablemente al bombeo de grandes cantidades de líquido a altas presiones, teniendo extremos de líquido provistos de manguitos intercambiables de 2½ a 5 carrera de 5 a 7 por 10 pulgadas. La figura 1740 muestra la bomba con propulsión de combinación de motor gas y gasolina. La figura 1741 muestra propulsión por motor diésel, y la 1742, propulsión sencilla por motor.

Estas bombas ofrecen todas las ventajas reconocidas del producto GASO. La caja del cigüeñal está completamente encerrada y las piezas móviles funcionan en baño de aceite. El cigüeñal y el árbol del piñón funcionan en cojinetes de rodillos cónicos Timken, de gran tamaño y aislados de la caja del cigüeñal. Los extremos de líquido pueden suministrarse con manguitos de especial aleación de acero cromonizada o con manguitos de hierro fundido y forro de bronce. Todas las bombas comprenden en su dotación normal

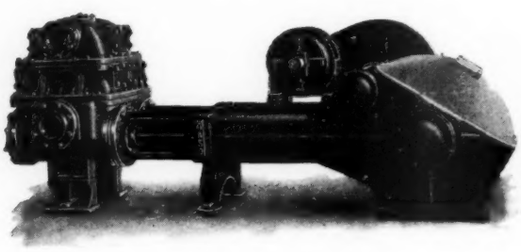


1742



1741

guarniciones de bronce y varillas de émbolo de acero. Podemos suministrar cualquier tipo de construcción de válvula que se requiera para un trabajo determinado. Las bombas pueden prepararse para cualquier tipo de propulsión: (1) polea para transmisión por correa; (2) conexión directa al motor mediante acoplamiento flexible; (3) motor eléctrico, mediante cadena o mecanismo de engranajes de reducción; (4) propulsión por cadena en V a motor eléctrico o motor multicilíndrico. Capacidades de 54 a 502 barriles por hora.



1931

SERIES 1900 — SUCTION PUMPS

This pump is admirably adapted for suction service where a vacuum pump of large capacity is required, or for discharge where the service calls for a pump of large capacity and low pressure. Features of construction include: Timken Tapered Roller Bearings, sealed off from crankcase; Monel Metal valves of light construction, with bronze seats; no over-lap of piston rods; wide face, stub tooth, semi-steel gear and forged steel pinion gear, running in oil; connecting rod crank end equipped with babbitt lined removable steel shell bearing.

Can be furnished with single train of gears and tight pulley, or arranged for direct drive by engine or electric motor through reduction gears.

Cylinder diameters 6" to 10"; capacities, 377 to 1045 barrels per hour.

POMPES ASPIRANTES—SERIE 1900

Cette pompe est admirablement adaptée au service aspirant là où on a besoin d'une pompe à vide de grand débit, ou pour décharge où le service demande une pompe de grand débit et de basse pression. Parmi les caractéristiques de construction figurent; Paliers à rouleaux coniques Timken, isolés du carter; soupapes en métal Monel de structure légère avec des sièges en bronze; aucun chevauchement des tiges de piston; engrenage à large face, à denture tronquée, en acier usiné, et engrenage de pignon en acier forgé, marchant dans l'huile; tête de bielle munie d'un palier amovible à corps d'acier et régulé.

Elles peuvent être fournies avec train d'engrenages unique et poulie fixe, ou prévues pour commande directe par groupe-moteur ou moteur électrique au moyen d'engranages réducteurs.

Diamètres de cylindre de 6 à 10 pouces; débits de 377 à 1045 barils à l'heure.

BOMBAS ASPIRANTES—SERIE 1900

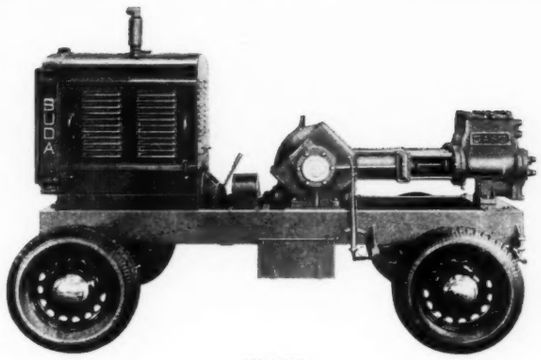
Esta bomba se presta admirablemente al servicio de aspiración donde se necesite una bomba al vacío de gran capacidad, o al servicio de descarga donde se requiera una bomba de gran capacidad y baja presión. Entre sus características se incluyen: cojinetes de rodillos cónicos Timken aislados de la caja del cigüeñal; válvulas de metal Monel de construcción liviana, con asientos de bronce; ninguna sobreposición de varillas de émbolo; engranaje de cara grande con dientes troncados; engranaje de semiacero y piñón de acero forjado, de funcionamiento en aceite; extremo de la biela en el cigüeñal provisto de buje con respaldo de acero amovible y forro de metal babbitt.

Puede suministrarse con juego sencillo de engranajes y polea instalada, o puede prepararse para propulsión por motor de combustión interna o motor eléctrico, empleando engranajes de reducción.

Diámetros del cilindro, 6 a 10 pulgadas; capacidades de 377 a 1045 barriles por hora.

Export Office: 149 Broadway, New York, N. Y.——*Bureaux d'exportation:* 149 Broadway, New-York, N.Y.

COMPANY, TULSA, OKLA., U. S. A.



2244-W

SERIES 2200 — PORTABLE PLANT

GASO Series 2200 Portable Pumping Plants, mounted on trailers or skids, are the latest addition to the Gaso line, having been produced in response to a demand for smaller portable units than are offered in our Series 2000 plants. These pumps are adaptable for any type of emergency, temporary or semi-permanent oil field service, such as water lines, gathering systems, booster stations and pick-up service.

The same construction features are offered as in GASO models of much higher price, including enclosed crankcase, working parts running in oil bath, and Timken Tapered Roller Bearings sealed off from crankcase. Fluid ends can be furnished with special alloy steel or bronze liners for special service. Pumps are arranged to drive as illustrated, with internal combustion engine through flexible coupling; or electric motor drive can be furnished. Size range, 2½" x 6" to 6" x 6"; capacities, 46 to 288 barrels per hour.

GROUPE PORTATIF—SERIE 2200

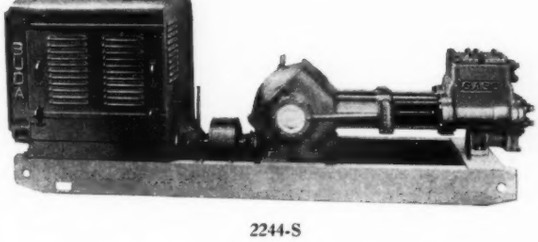
Les groupes de pompage portatifs GASO de la série 2200, montés sur remorques ou patins, sont la dernière addition à la série Gaso, ayant été produits pour répondre à la demande en faveur de plus petits groupes portatifs que ceux offerts par nos groupes Série 2000. Ces pompes sont adaptables à tout type de service de champ pétrolier de secours temporaire ou semi-permanent, tel que pour conduites d'eau, systèmes collecteurs, stations de renfort et service de reprise.

Les mêmes caractéristiques de construction sont offertes que sur les modèles GASO bien plus chers, y compris carter clos, pièces mobiles travaillant en bain d'huile, et paliers à rouleaux coniques Timken isolés du carter. Les bouts à liquide peuvent être fournis avec fourreaux en acier spécial ou en bronze pour service spécial. Les pompes sont prévues pour commande comme celle du cliché, avec moteur à combustion interne par accouplement flexible; ou par commande à moteur électrique au choix. Choix de tailles de 2½ x 6 pouces à 6 x 6 pouces; débits de 46 à 288 barils à l'heure.

GRUPO PORTATIL—SERIE 2200

Los grupos portátiles de bombas GASO de la serie 2200, montados en remolques o en patines, son la más reciente adición al surtido GASO, habiéndose fabricados en respuesta a una demanda de grupos portátiles menores que los de nuestra serie 2000. Estas bombas se adaptan a cualquier trabajo provisional o semi permanente, en tubería de agua, sistemas de recolección, estaciones de amplificación y otros servicios corrientes.

Estos grupos ofrecen las mismas características de construcción que los modelos GASO más caros, y entre sus rasgos se incluyen caja de cigüeñal cerrada, con todas las piezas móviles funcionando en baño de aceite; cojinetes de rodillos cónicos Timken aislados de la caja del cigüeñal. Los extremos de líquido pueden suministrarse con manguitos especiales de aleación de acero o de bronce, para servicios extraordinarios. Las bombas están dispuestas para funcionar, como se ve en la ilustración, con motor de combustión interna, mediante acoplamiento flexible; también pueden suministrarse con propulsión por motor eléctrico. Tamaños de 2½ x 6 a 6 x 6 pulgadas; capacidades de 46 a 288 barriles por hora.



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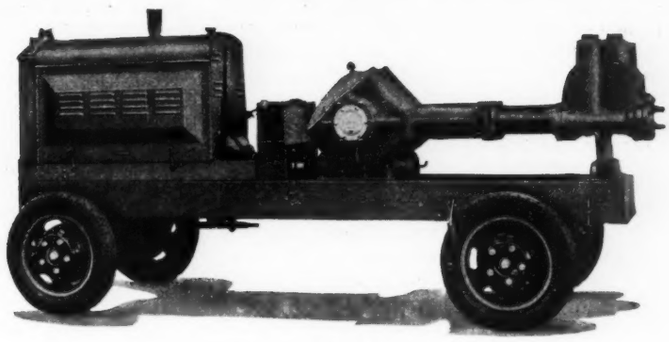


2019-W

SERIES 2000 — PORTABLE PLANT

GASO Series 2000 Portable Pumping Plants, mounted on trailers or skids, are of larger capacity and of heavier construction than Series 2200. They are ideal for permanent or semi-permanent pipe line stations, water service for drilling operations, pickup in case of line breaks, mudding or cementing operations and for any other purposes that a general type pump can be utilized.

Pumps have the recognized Gaso features, including oil-tight and dust-proof enclosed crankcase, working parts running in oil bath, and Timken Tapered Roller Bearings sealed off from crankcase. Bearings for the steel worm are a double row of Timken Tapered Roller Bearings of large dimensions.

Power unit is 4-cylinder, extra heavy duty oil field type engine, of medium speed, burning natural residue gas or gasoline. Trailers have 10-inch channel iron frames, reinforced and welded throughout. Wheels are steel mounted on Timken Roller Bearings and equipped with heavy duty truck tires.

Pump cylinder sizes, 2½" x 10" to 7" x 10"; capacities, 59 to 508 barrels per hour.

GROUPE PORTATIF—SERIE 2000

Les groupes de pompage portatifs GASO de la série 2000, montés sur remorques ou patins, sont de de plus fort débit et de plus forte construction que ceux de la série 2000. Ils sont l'idéal pour les stations de pipe-lines permanentes ou semi-permanentes, pour service à eau en opérations de forage, pour reprise en cas de ruptures de conduite, pour opérations de bouage ou de cimentation, et pour toute autre fin convenant à une pompe du type d'usage général.

Ces pompes ont les caractéristiques Gaso reconnues, y compris un carter clos étanche à l'huile et à l'abri de la poussière, pièces mobiles travaillant en bain d'huile, et paliers à rouleaux coniques Timken et isolés du carter. Les paliers pour la vis sans fin en acier sont une double rangée de paliers à rouleaux coniques Timken de fortes dimensions.

Le groupe-force est un moteur de 4 cylindres, du type pour champs de pétrole, de service extra-dur, de vitesse moyenne, qui brûle du gaz naturel résiduaire ou de l'essence. Les remorques ont des bâtis en fer profilé de 10 pouces, renforcés et soudés d'un bout à l'autre. Les roues sont à monture d'acier sur roulements à rouleaux Timken et munies de pneus de camions de service dur.

Tailles de cylindres de pompe: 2½ x 10 pouces à 7 x 10 pouces; débits de 59 à 508 barils à l'heure.

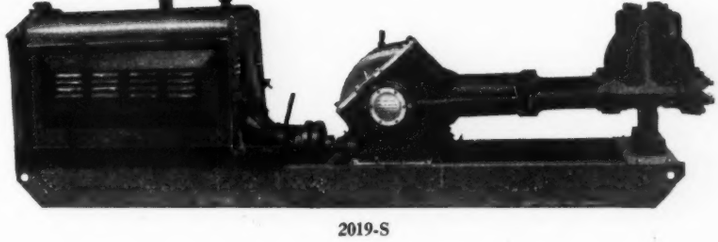
GRUPO PORTATIL—SERIE 2000

Los grupos portátiles de bombas GASO de la serie 2000, montados en remolques o patines, son más grandes en capacidad y más pesados en construcción, que los de nuestra serie 2200. Son ideales para servicio permanente o semi permanente de tubería de agua, trabajos de perforación, reparación en caso de rotura de tubería, manejo de lodo, cementación y otras obras para las cuales se requiere un tipo de bomba de utilidad general.

Estas bombas tienen todas las reconocidas ventajas GASO, incluyendo caja de cigüeñal cerrada, a prueba de polvo y escape de aceite, con todas las piezas móviles funcionando en baño de aceite y cojinetes de rodillos cónicos Timken aislados de la caja del cigüeñal. El tornillo sin fin de acero funciona en cojinetes de doble corrida de rodillos cónicos, de marca Timken, de grandes dimensiones.

Tiene un motor de cuatro cilindros, de trabajo pesado, especial para servicio en campos petrolíferos, de mediana velocidad, que funciona con gas natural o con gasolina. Los remolques tienen bastidores de hierro acanalado de 10 pulgadas, soldados y muy bien reforzados. Las ruedas son de acero y funcionan en cojinetes de rodillos Timken, llevando neumáticos de camión, de servicio pesado.

Tamaños del cilindro de la bomba, de 2½ x 10 a 7 x 10 pulgadas; capacidades de 59 a 508 barriles por hora.



2019-S

Oficina de exportación: 149 Broadway, Nueva York, N.Y., E.U.A.

feet to the inch for depths and 4 feet per hour to the inch for drilling speed.

After depth and speed of drilling have been plotted the actual and adjusted logs of the well can be plotted on the same vertical scale and on the same sheet of graph paper. When such a graph is completed it can be seen how the log of changes in formations and drilling speeds correlated and if desired more than one well can be plotted on the same sheet of paper so that correlation can be made between wells.

This type of work is comparatively new and the results obtained are interesting. In some instances "markers" are found with the drill which previously had not been noted in the samples, and also some which are not revealed by any sampling method. It is also true the samples show some markers that the drill does not reveal. Conspicuous changes in formations are easily noted by both drill record and examination of samples, and as drillers become more accustomed to this practice and keep better records they will become increasingly proficient in noting changes in formations as penetrated. When such records are filed they will serve to aid in the later completion and repair work on the well.

FROZEN CASING

It is not an uncommon occurrence in rotary drilling for drill pipe to stick in the hole. There may be several reasons for its sticking, but the main one is accumulation of cuttings around the pipe in such a compact mass as to prevent withdrawal. While this has been known as one of the evils of rotary practice, not much has been done about finding a practical means of reducing the hazard. Experienced drillers know the things to avoid if the drill pipe is to be kept free, but engineers only recently have awakened to the realization that they might play an important part in solving this problem. Some laboratory experiments have been carried out and the results have been encouraging.

The method of approaching the problem has been through the use of small-scale apparatus in the laboratory and the recording and studying of actual field conditions and of accident cases. The A. P. I. committee on drilling practice has helped in this work by sending out questionnaires asking for information regarding causes and cures for stuck pipe. This problem involves the sticking of casing and tubing as well, but the main problem is to eliminate the sticking of rotary drillpipe.

In the laboratory experiments 6-foot lengths of 2-inch inside-diameter glass tubing were used to represent the drilled hole. Bulbs were blown in this glass tubing at intervals to represent enlarged sections of the hole which are common in all uncased portions of the well. Smaller-diameter glass tubing was used for drillpipe.

With this apparatus it was possible to observe the action of the up-current of water and sand as they moved from the bottom toward the top of the hole. The space between the drillpipe and the inside of the 2-inch tubing was filled with screened river sand. Actual well cuttings were used in some of the experiments. Under these conditions it was observed that as the up-current of drilling fluid passed through the areas of greater cross section the velocity of the current was reduced and the carrying power of the fluid was reduced proportionately. This action had a tendency to classify out the larger particles of sand or cuttings and leave them behind in the caved portion of the hole. As these larger particles accumulated a bridge was formed in the annular space around the drillpipe and this accumulation served as a plug to hold back smaller particles of sand carried upward by

(Continued on Page 187)

de papier graphique les données réelles et ajustées des rapports journaliers de forage. Une fois un tel graphique terminé, on se rend compte du degré de corrélation entre les données journalières des changements de formations et les vitesses de forage, et si on le désire on peut porter les données de plusieurs puits sur une même feuille graphique afin d'étudier la corrélation entre eux.

Ce genre de travail est assez nouveau et les résultats sont intéressants. Dans certains cas on trouve au forage des "repères" qui n'avaient pas été notés précédemment sur les échantillons, et d'autres qu'aucune méthode d'échantillonnage n'est à même de révéler. Il est vrai par contre que les échantillons révèlent certains repères que le foret ne décèle pas. Les changements marquants de formations sont faciles à noter par l'examen des enregistrements de forage et celui des échantillons, et à mesure que les foreurs s'habituent à cette méthode et tiennent des enregistrements plus soignés ils deviennent plus habiles pour repérer les changements de formations dès l'instant qu'ils ont lieu. On peut conserver ces graphiques qui seront utiles par la suite pour achever ou réparer le puits.

COINCAGE DU REVETEMENT

Il n'est pas rare en forage rotatif que le tuyau de foret se coince dans le puits. Il peut y avoir plusieurs raisons à ce coinçage, mais le principal réside dans l'accumulation de débris autour du tuyau à un point tel qu'on ne puisse plus le retirer. Bien que l'on sache que c'est là un des maux du forage rotatif, on n'a pas fait grand'chose pour trouver un moyen pratique apte à réduire ce risque. Les foreurs expérimentés savent ce qu'il faut faire pour que le tuyau de foret reste libre, mais ce n'est que récemment que les ingénieurs se sont rendu compte du rôle important qu'ils pouvaient jouer pour résoudre ce problème. On s'est mis à expérimenter au laboratoire et les résultats ont été encourageants.

On a abordé le problème par l'emploi au laboratoire d'appareils miniatures et par l'enregistrement et la mise à l'étude des conditions sur les chantiers et des cas d'accidents. Le comité A.P.I. qui étudie les pratiques de forage a aidé dans ce travail en distribuant des questionnaires ayant pour but de préciser les causes et les remèdes du coinçage de tuyau. Cette question a trait aussi au coinçage du revêtement et du tubage, mais le problème est surtout d'éliminer le coinçage du tuyau de foret rotatif.

Dans les essais de laboratoire on a utilisé des longueurs de 6 pieds de tube de verre d'un diamètre intérieur de 2 pouces pour représenter le trou de forage. On souffla des renflements dans ce tube de verre ici et là pour représenter des parties élargies du puits, ce qui est fréquent dans toutes les parties sans revêtement du trou de forage. On utilisa du tube de moindre diamètre pour le tuyau de foret.

Avec cet appareil on a pu observer l'action du courant remontant d'eau et de sable depuis le fond du puits jusqu'au sommet. On remplit de sable de rivière tamisé l'espace compris entre le tuyau de foret et l'intérieur du tube de 2 pouces. Dans certains essais on fit emploi de véritables débris de puits. Dans ces conditions on observa que lorsque le courant remontant de liquide de forage passait à travers les parties de plus forte section le courant perdait de sa vitesse et le pouvoir portant du liquide en était réduit d'autant. Cette action se traduisit par une tendance des grosses particules de sable et de débris à s'écarter du courant et à s'arrêter dans la partie du puits formant cavité. Avec l'accumulation de ces grosses particules un pont se forma dans l'espace annulaire tout autour du tuyau de foret et cette accumulation fit bientôt tampon retenant les petites particules de sable que le courant entraînait vers le haut. Cette réduction de vitesse du courant remontant entraîna une accumulation de plus en plus marquée de sable ou de débris endessous du pont et du tampon. Ces particules tassées étaient tenues en place par le courant remontant et à la longue la pression exercée sur l'extérieur du tuyau de foret devint suffisante pour empêcher qu'on puisse remuer ce dernier.

La force d'adhérence exercée par cet amas de sable ou de débris peut se calculer en employant la formule suivante:

$$S = \frac{P}{\pi DL} \text{ livre par pouce carré}$$

où D = diamètre extérieur du tuyau en pouces carrés.

(Continué sur Page 187)

hacen estudios sobre la rapidez con que se perforan, bajo un régimen de condiciones fijas, resulta entonces posible correlacionar las formaciones en los diferentes pozos de un mismo campo. Este método de obtener informaciós es útil en la terminación del pozo y también en la acumulación de datos, que sirven más tarde para su reparación.

Las velocidades de la perforación, expresadas en piés por hora, y las profundidades, se trazan en un papel cuadriculado ordinario, y se emplea cualquier escala conveniente para el ingeniero. Las profundidades verticales se anotan ordinariamente como ordenadas y las velocidades de la perforación, como abscisas. Las escalas empleadas pueden estar en relación de 10 a 1, por ejemplo, 40 pies por pulgada para las profundidades y 4 pies por hora por pulgada para la velocidad de la perforación.

Después de trazar la profundidad y la velocidad de la perforación, puede entonces anotarse el registro preciso y rectificado del sondaje del pozo, en la misma escala vertical y en la misma hoja de papel cuadriculado. Terminada esta representación gráfica, se verá cómo se correlaciona el registro de cambois en las formaciones y velocidades de perforación, y cuando se quiera, se podrá registrar más de un pozo en la misma hoja de papel, para que esta correlación se haga entre varios pozos.

Este tipo de trabajo es comparativamente nuevo y los resultados obtenidos son interesantes. En algunos casos, se descubren con la sonda "marcadores," que anteriormente no se habían observado en las muestras, y también, algunos que no se revelan por ningún método de sacar muestras. También es cierto que las muestras dan marcadores que la sonda deja de revelar. Se anotan facilmente los cambios importantes en las formaciones mediante el registro del sondaje y estudio de las muestras, y a medida que los operarios se acostumbran más a esta práctica y mantienen mejores registros, se hacen más expertos en anotar los cambios en las formaciones durante la perforación. Semejantes registros, archivados metódicamente, ayudan después a completar el pozo, y más tarde, a repararlo.

ATASCAMIENTO DEL REVESTIMIENTO

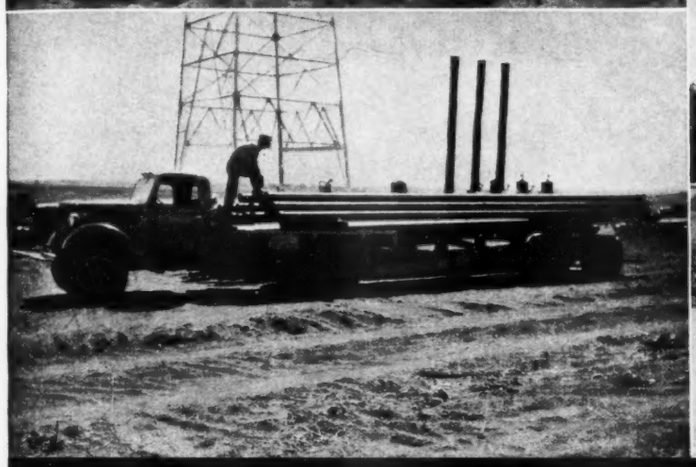
Con frecuencia sucede, en la perforación rotativa, que el tubo de perforación se atasca en el hoyo. Este atascamiento se debe a varias razones, pero la principal es la acumulación de partículas alrededor del tubo, en una masa tan compacta que impide su retirada. Aunque se sabe que éste es uno de los inconvenientes de la perforación rotativa, poco se ha hecho en descubrir un medio práctico y seguro de reducir el riesgo. Los perforadores de experiencia saben lo que es necesario hacer para que el tubo de perforación quede libre, pero sólo ha sido últimamente que los mismos ingenieros se han dado cuenta de que ellos pueden también desempeñar importante papel en la solución del problema. Se han puesto a hacer experimentos en laboratorios, con resultados muy prometedores.

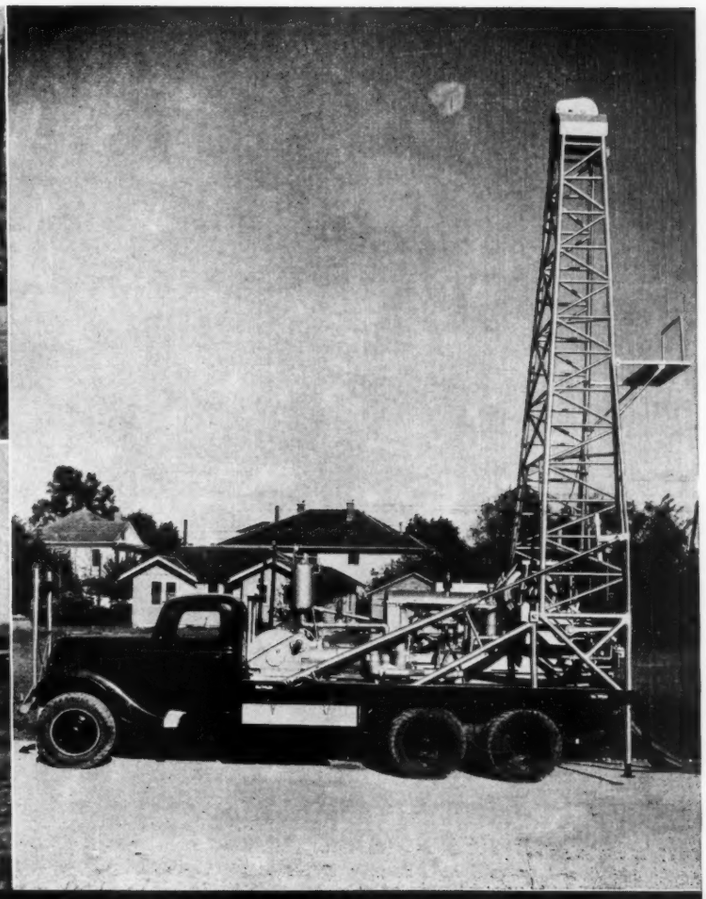
El método de abordar el problema ha sido el empleo, en el laboratorio, de aparatos en pequeña escala, y la anotación y estudio de las condiciones actuales en los mismos campos petrolíferos y de casos de accidentes. El comité a cargo del estudio de asuntos de perforación del American Petroleum Institute (A.P.I.) ha prestado valiosa ayuda a este trabajo, distribuyendo cuestionarios y pidiendo información sobre las causas y remedios del atascamiento del tubo de perforación. Este problema comprende no sólo el atascamiento del tubo de perforación, sino también el del revestimiento del pozo. El problema principal, sin embargo, es evitar el atascamiento del tubo de perforación.

En los experimentos de laboratio se emplearon tubos de vidrio de 6 piés de longitud y 2 pulgadas de diámetro interior, para representar el hoyo perforado. En los tubos de vidrio se soplaron abultamientos a intervalos, para representar las secciones agrandadas del hoyo, que son tan comunes en en las paredes sin revestimiento del pozo. Se empleó un tubo de vidrio de menor diámetro, para representar el tubo de perforación.

Con este aparato fué posible observar la acción de la corriente ascendente de agua y arena, en su movimiento desde el fondo hasta la boca del hoyo. El espacio entre el tubo de perforación y la parte interior del tubo de dos pulgadas de diámetro, se llenó con arena de río tamizada. En algunos experimentos se emplearon verdaderas partículas

(Continué en Página 187)





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With all four, or all six wheels propelling, as well as carrying the load, a MARMON-HERRINGTON *all-wheel-drive* truck has the ability to go places no conventional type wheeled vehicle would dare to go. It has the power to haul bigger loads over difficult roads — *or where there is no road at all.* Its superior traction provides greater safety, greater economy, and longer life — due to lessened strain on chassis and motor. Oil men all over the world have learned that a MARMON-HERRINGTON will always get there, and back, with a heavier load — no matter where you want to go.

In addition to the regular line of extra heavy duty *all-wheel-drive* trucks, with load capacities up to 25 tons — MARMON-HERRINGTON converts in its own plant all Ford models for *all-wheel-drive* — trucks, truck-tractors, commercial and passenger cars. A sensational, new high-speed, light-weight Track-Laying Tractor has recently been added. Ask for particulars and prices on any or all of these units. Cable address, MARTON, Indianapolis, U. S. A.

Con todas las cuatro, o con todas las seis ruedas dando propulsión y al mismo tiempo llevando la carga, un camión MARMON-HERRINGTON con *propulsión por todas sus ruedas* tiene la facultad de ir a puntos a los cuales el vehículo de construcción ordinaria no puede llegar nunca. Tiene la fuerza para transportar cargas más grandes por carreteras en mal estado—*o por lugares donde no hay ninguna carretera.* Su excelente fuerza de tracción asegura mayor seguridad, mayor economía y mayor duración—debido a menor esfuerzo o tensión sobre el motor y el chasis. Los dedicados a la industria del petróleo, en todo el mundo, están ya al corriente de que un MARMON-HERRINGTON siempre llega a su destino y regresa al punto de partida con una carga más grande, pasando por todas partes, sin que nada lo detenga.

Además de su corriente surtido de camiones con *propulsión por todas sus ruedas*, de trabajo pesado, con capacidades de carga hasta 25 toneladas—la MARMON-HERRINGTON convierte, en su propia fábrica, todos los modelos Ford—camiones, camiones tractores, tipos comerciales y automóviles—en vehículos *con propulsión por todas sus ruedas.* Recientemente hemos agregado a nuestro surtido un admirable tractor de alta velocidad y de peso liviano, para colocar rieles. Sírvase pedirnos información completa y precios sobre cualquiera o todos estos modelos. Dirección telegráfica: MARTON, Indianapolis, U. S. A.

Avec les quatre ou les six roues toutes motrices, ainsi que toutes portant la charge, un camion *toutes roues motrices* MARMON-HERRINGTON a le privilège d'aller dans des lieux où aucun véhicule du type à traction courante n'oserait s'aventurer. Il a le pouvoir de transporter des charges plus fortes sur des routes difficiles—*ou même où il n'y a pas de route du tout.* Son pouvoir de traction supérieur assure une plus grande sécurité, une plus grande économie, et une plus longue vie utile—par suite d'une moindre fatigue subie par le châssis et le moteur. Les spécialistes du pétrole ont appris, dans le monde entier, qu'un MARMON-HERRINGTON arrive toujours à sa destination, et revient au point de départ, avec une plus forte charge—où que vous décidiez de vous rendre.

En plus de sa série normale de camions *toutes roues motrices* de service extra-dur, de capacités de charge allant jusqu'à 25 tonnes—MARMON-HERRINGTON convertit dans sa propre fabrique tous les modèles Ford pour en faire des camions, des camions-tracteurs, des voitures utilitaires et de tourisme du type *toutes roues motrices.* Il a récemment été ajouté un tracteur nouveau et sensationnel pour la pose de rails, de grande vitesse et de faible poids. Détails et prix de l'un quelconque ou de tous ces modèles sur demande. Adresse télégraphique: MARTON, Indianapolis, U.S.A.

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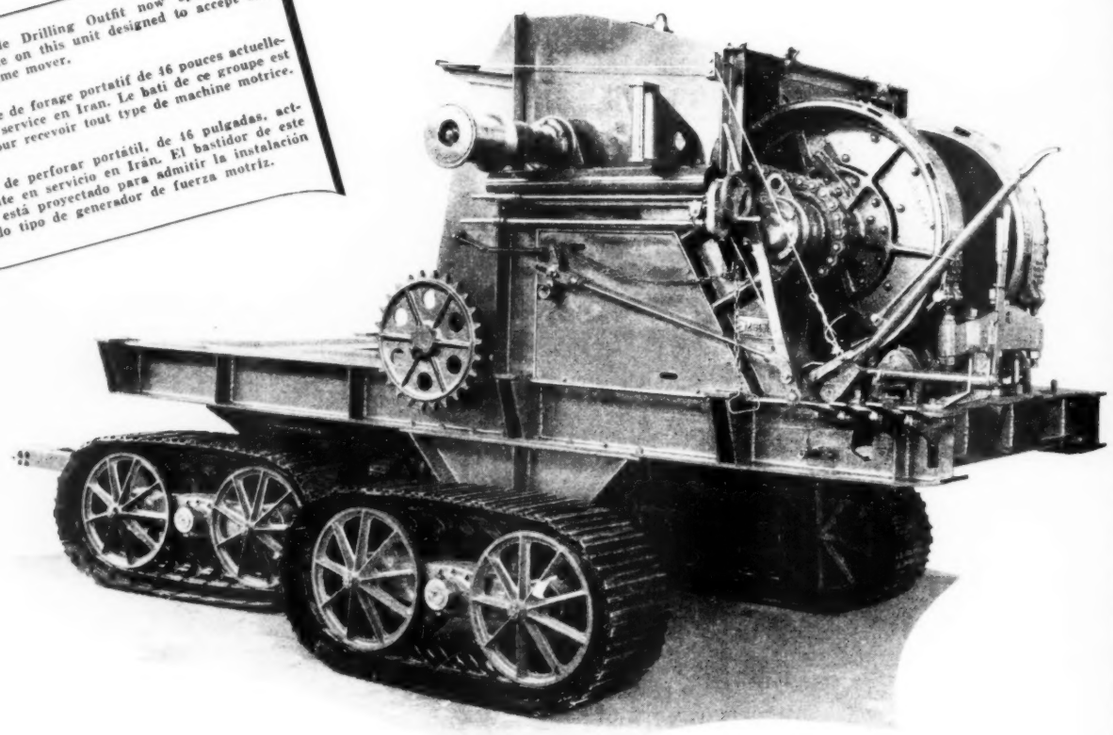
46" Portable Drilling Outfit now operating in Iran. Frame on this unit designed to accept any type of prime mover.

Nécessaire de forage portatif de 46 pouces actuellement en service en Iran. Le bati de ce groupe est conçu pour recevoir tout type de machine motrice.

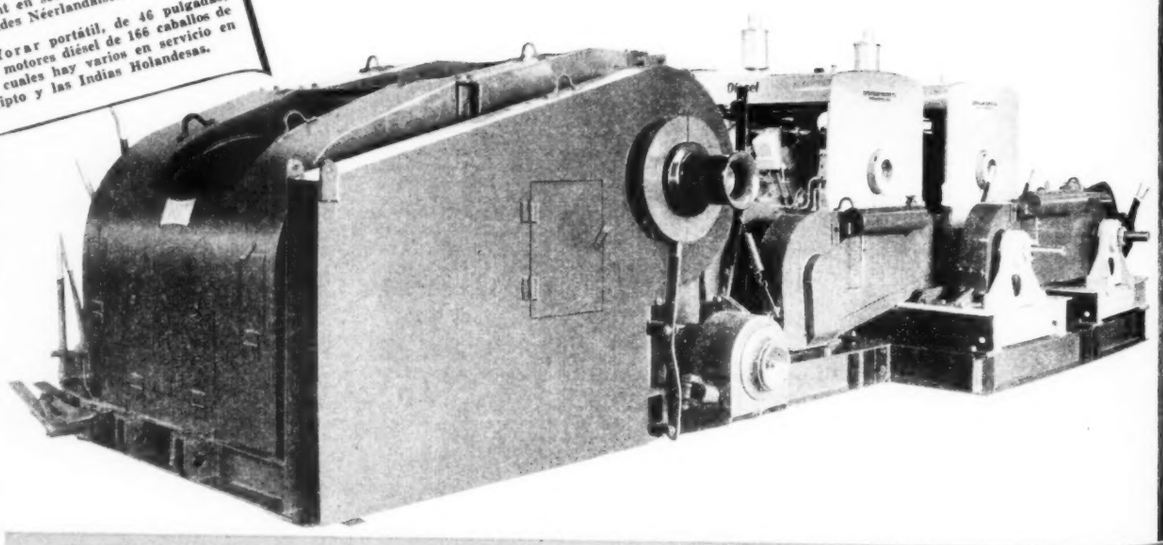
Equipo de perforar portátil, de 46 pulgadas, actualmente en servicio en Irán. El bastidor de este grupo está proyectado para admitir la instalación de todo tipo de generador de fuerza motriz.

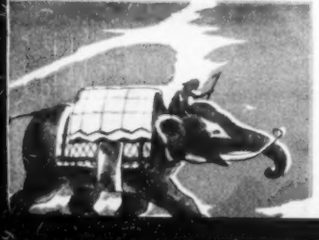


46" Portable Drilling Outfit powered by two 166 H.P. Diesel Engines, several of which are operating in Venezuela, Egypt and Dutch East Indies.

Nécessaire de forage portatif de 46 pouces actionné par deux moteurs Diesel de 166 H.P., dont plusieurs sont en service au Vénézuéla, en Egypte et aux Indes Néerlandaises.

Equipo de perforar portátil, de 46 pulgadas, provisto de dos motores diésel de 166 caballos de fuerza, de los cuales hay varios en servicio en Venezuela, Egipto y las Indias Holandesas.





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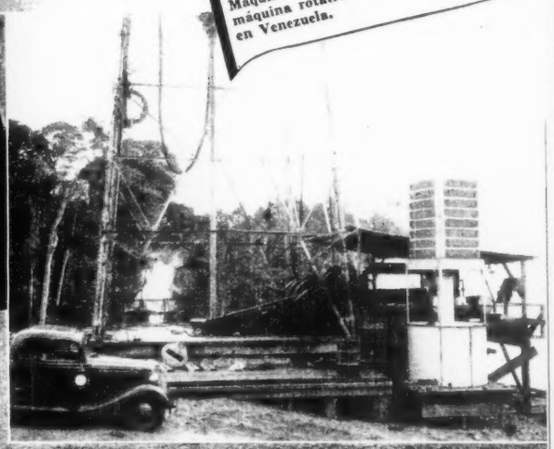
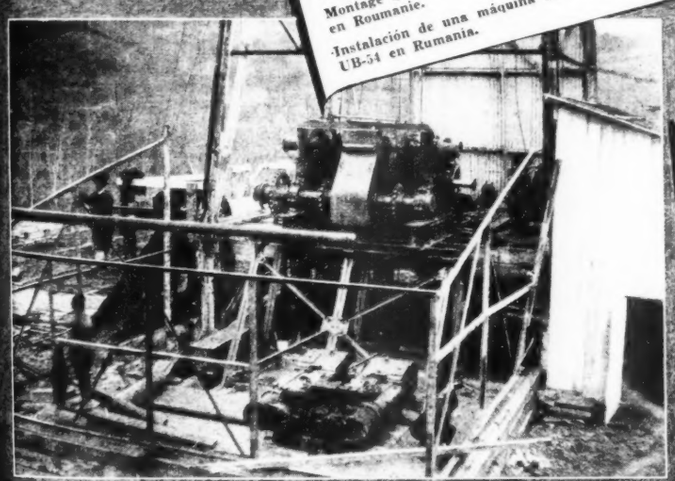
Los equipos Emsco para la perforación de pozos profundos, gozan de merecida fama en todo el mundo.



UB-54 Emsco Drawworks and H-27½ Rotary Machine in service in Venezuela.

Groupe de traction Emsco UB-54 et machine rotative H-27½ en service au Vénézuéla.

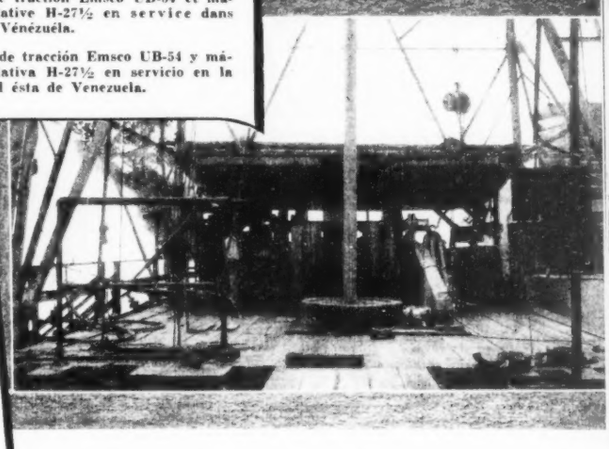
Máquina de traccion Emsco UB-54 y máquina rotativa H-27½ en servicio en Venezuela.



Rigging up UB-54 Emsco Drawworks in Roumania.

Montage d'un groupe de traction Emsco UB-54 en Roumanie.

Instalación de una máquina de tracción Emsco UB-54 en Rumania.



UB-54 Emsco Drawworks and H-27½ Rotary Machine operating in Eastern Venezuela.

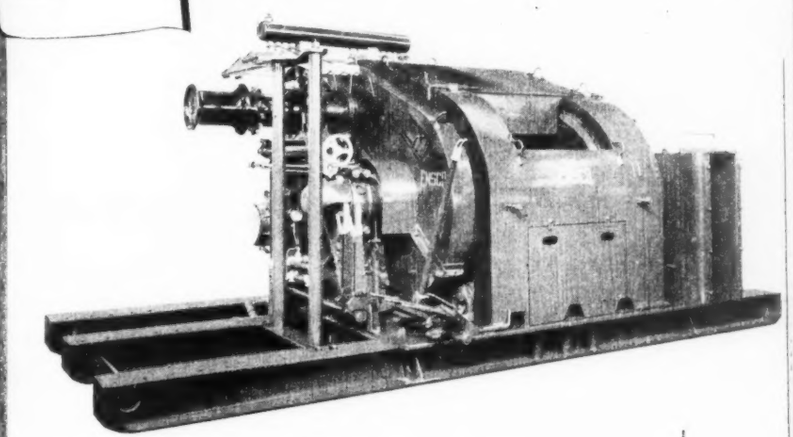
Groupe de traction Emsco UB-54 et machine rotative H-27½ en service dans l'Est du Vénézuéla.

Máquina de tracción Emsco UB-54 y máquina rotativa H-27½ en servicio en la región del ésta de Venezuela.

Heavy UBLS-54 Emsco Drawworks suitable for any deep well operation.

Groupe de traction pesant Emsco UBLS-54 adapté a toute opération de puits profonds.

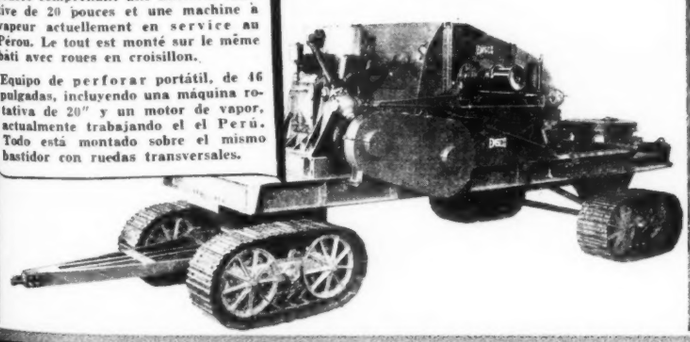
Máquina de tracción pesada Emsco UBLS-54, adaptada a todo trabajo de pozos profundos.



46" Portable Drilling Outfit including 20" Rotary Machine and Steam Engine now operating in Peru. All mounted on same frame with cross wheels.

Nécessaire de forage portatif de 46' pouces comprenant une machine rotative de 20 pouces et une machine à vapeur actuellement en service au Pérou. Le tout est monté sur le même bâti avec roues en croisillon.

Equipo de perforar portátil, de 46 pulgadas, incluyendo una máquina rotativa de 20" y un motor de vapor, actualmente trabajando el el Perú. Todo está montado sobre el mismo bastidor con ruedas transversales.



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PROTECTEURS DE REVETEMENTS EN SERVICE A L'ETRANGER

Les protecteurs de revêtements ne sont utiles que s'ils ont une vie utile normale, ne se fendent pas pendant la pose, et ne glissent pas pendant la période la plus critique du forage d'un puits de pétrole. Quand ils se fendent, c'est qu'ils sont vulcanisés trop durs, et quand ils glissent, c'est qu'ils sont vulcanisés trop tendres. Ce défaut est un des points les plus importants qu'un opérateur en chantier étranger devrait considérer dans le choix d'un protecteur de revetement. Sans cette protection, tout le projet est mis en danger. Les protecteurs Patterson-Ballagh sont fabriqués par les pionniers dans la confection de cet article, fabriqués, dans leur propre usine, contrôlée scientifiquement, où des millions de livres de cette qualité unique de caoutchous ont été employés dans toutes les parties du monde. Ils sont mis "à l'épreuve du climat" avant l'expédition et le fait d'insister pour qu'aucun article de substitution ne soit fourni pour raison de moindre prix est la garantie de l'opérateur que le protecteur le plus économique est employé. Donc, SPECIFIEZ BIEN PATTERSON-BALLAGH.

PROTECTORES DE REVESTIMIENTOS EN SERVICIO EN EL EXTRANJERO

Los protectores de revestimientos son útiles sólo cuando tienen una duración normal, no se parten o rompen durante la instalación y no se resbalan en el período más crítico de la perforación de un pozo de petróleo. Aquellos que se parten han sido vulcanizado con mucha dureza y aquellos que se resbalan han sido vulcanizado con mucha blandura. Esta falla es una de las cosas más importantes que los explotadores en el extranjero deben considerar en la elección de protectores de revestimientos. Sin esta protección, se pone en peligro todo el proyecto. Los protectores de revestimientos Patterson-Ballagh se hacen por los primeros fabricantes en dedicarse a estos productos. Se hacen en sus propias fábricas, bajo un control científico, donde millones de libras de esta especial clase de caucho han sido empleadas en estos productos para uso en todas partes del mundo. Se prepararan a "prueba de clima" antes de la expedición y el hecho de que se insista en que no deba emplearse un substituto, nada más por que es más barato, es una garantía de verdadera economía en beneficio del comprador. Le conviene, por lo tanto, especificar los protectores PATTERSON-BALLAGH.

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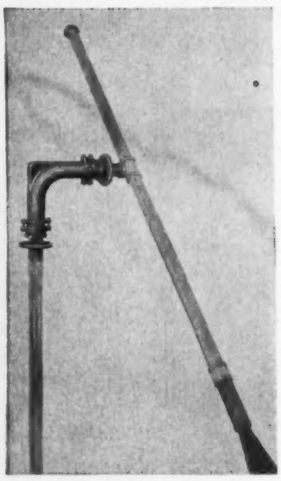

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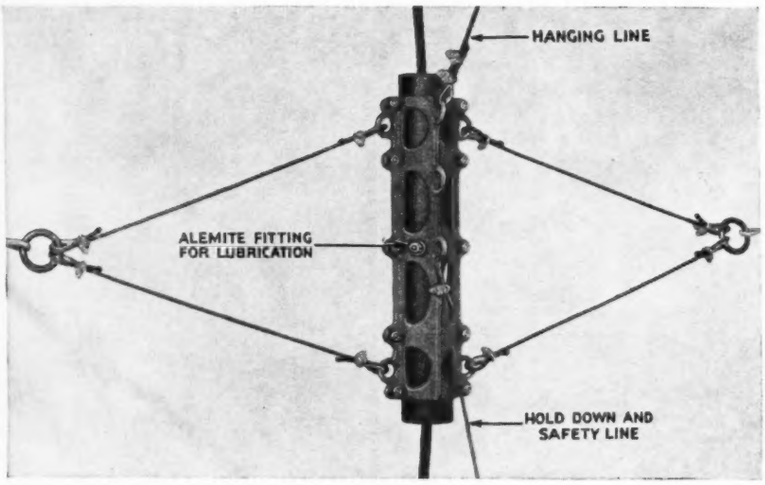

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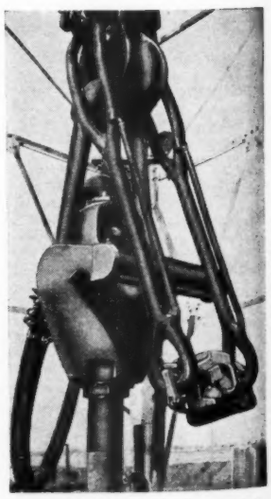
Simple and effective Wire Line Guide. Rubber-lining gives long life; is fireproof; acts as lubricator. Adds hundreds of ton-miles to life of line. One of the biggest dividend payers an Overseas Operator can buy. Useful on ALL rotary wells, regardless of depth.

Send for Descriptive Literature.



SWIVEL BAIL PROTECTOR

A Rubber cushion that adds life to both swivel bails and swivels of most standard makes. Available for most models. Adopted by leading swivel manufacturers as optional or standard on new equipment.

the current. This reduction in velocity of the up-current gradually caused more and more of the sand or cuttings to accumulate below the bridge and pack. These packed particles were held in place by the up-current; and in time the pressure exerted on the outside of the drillpipe was sufficient to prevent it from being moved.

The gripping force exerted by this pack of sand or cuttings can be calculated using the following formula:

$$S = \frac{P}{\pi DL} \text{ pound per square inch}$$

Let D= outside diameter of pipe in square inches.

L= length gripped in inches.

P= the effective pull in pounds.

S= the interfacial shear in pounds per square inch.

From field reports it has been learned that in many instances pipe or liners stuck in the hole had been released when the pumps were shut down, either intentionally or unintentionally. The laboratory experiments showed that as long as the pump pressure was maintained the packing action below the bridge continued and the pipe was held fast. When the up-current stream was slowed down or stopped the force of gravity caused the packed sand or cuttings to fall away from beneath the bridged portion of the hole and in this manner the frozen pipe was released.

The experiments also showed that jarring the pipe would cause the cuttings to pack around it in such a manner as to cause it to be held. In like manner it was demonstrated that jarring of the drillpipe could release the packed cuttings in many instances, and permit the pipe to be moved.

From these experiments it has been concluded that when pipe has been stuck, but circulation maintained, one of the first things to do is to shut down the pumps and relieve the up-current pressure. If this does not effect the desired results it is suggested that alternate starting and stopping of the pumps be tried. Also the drillpipe may be tapped lightly, or a water-hammer may be created by pinching the pump suction.

TRANSPORTING DRILLING MACHINERY

Drilling equipment used for the digging of modern wells has been so simplified that it is possible to mount each piece upon a skid and transport it as a unit. As the time required for drilling wells has been reduced materially, it is necessary to move this equipment from one location to another frequently. The drilling contractor does not earn money on his investment in drilling equipment while it is being moved and it behooves him to find means of transferring the rig from location to location in the shortest possible time. For the same reason company tools must be moved quickly.

To accomplish these results it is now customary to standardize setting plans. Details usually are worked out in the engineering office and a set of drawings is prepared showing just where each piece of equipment is to be placed with relation to the well location and to each other piece of machinery.

Having the setting plans worked out, the next step is to standardize on the material to be handled by each truck and to determine the sequence of moving operations. As the heavy-duty trucks now used in the oil fields usually are equipped with winches and cranes, it is possible to place any unit of drilling equipment on the desired truck in a minimum of time. This work is carried out by following a schedule, and each load is transported to

(Continued on Page 191)

L = longueur adhérée en pouces.

P = traction effective en livres.

S = cisaillement interfacial en livres par pouce carré.

On a appris des rapports des chantiers que dans de nombreux cas on a réussi à libérer des tuyaux ou des chemises coincés dans le puits après avoir arrêté les pompes avec intention ou non. Les essais de laboratoire ont prouvé que tant qu'on maintenait la pression de pompe le tassage se continuait sous le pont et le tuyau était fortement coincé. Mais après ralentissement ou arrêt du courant remontant, la pesanteur se chargea de détacher l'amas de sable ou de débris de dessous la partie pontée du puits, et ainsi on put retirer le tuyau coincé.

Ces expériences ont aussi montré que l'ébranlement du tuyau ne ferait que favoriser l'entassement des débris autour de lui d'une manière l'immobilisant totalement. De même il a été prouvé qu'on pouvait dans de nombreux cas libérer les débris entassés en ébranlant le tuyau de foret, et alors remuer le tuyau.

On a conclu de ces essais que lorsqu'un tuyau s'est coincé, mais qu'on a maintenu la circulation, une des premières choses à faire est d'arrêter les pompes et de soulager la pression du courant remontant. Si on n'obtient pas ainsi les résultats attendus, on pourra essayer des mises en marche et arrêts successifs des pompes. On peut aussi taper légèrement sur le tuyau de foret, ou encore créer un coup d'eau par pincement de la succion de pompe.

TRANSPORT DU MATERIEL DE FORAGE

Le matériel de forage qu'on emploie pour creuser les puits modernes a été simplifié à un point tel qu'il est possible de monter chaque organe sur un traîneau et d'en faire le transport en bloc. Etant donné que le temps nécessaire pour forer les puits a été notablement réduit, on doit souvent déplacer le matériel d'un endroit à un autre. L'entrepreneur de forage ne gagne rien sur son capital engagé en matériel de forage pendant le transport, d'où il importe qu'il trouve le moyen de transporter ce matériel d'un point à un autre dans le court laps de temps possible. Pour la même raison les outils des compagnies doivent aussi être transportés rapidement.

A cette fin, il est maintenant d'usage de standardiser les plans de montage. Les détails sont généralement mis au point dans le bureau d'études qui prépare une série de plans indiquant exactement la place de chaque pièce de matériel par rapport à l'emplacement du puits et à chaque autre pièce.

Les plans de montage étant dressés, il s'agit ensuite de standardiser le type de matériel que chaque camion devra transporter, puis de fixer la succession des opérations de transfert. Etant donné que les camions de service dur actuellement en usage dans les champs de pétrole sont en général équipés de treuils et de grues, il est possible de charger tout groupe de matériel de forage sur le camion désiré dans un temps très court. Ce travail est exécuté en suivant un tableau horaire, et chaque chargement est amené au nouveau chantier et mis en position de travail avec le plus petit nombre possible de déplacements. Grâce à ces méthodes le temps nécessaire au montage du matériel a été réduit de 10½ jours en mars 1935 à environ 1 à 1,3 jour en janvier 1937. De même le temps nécessaire au démontage a été réduit fortement de sorte que le matériel est occupé en forage effectif pendant une portion beaucoup plus forte du temps total.

ENREGISTREURS DE TEMPERATURES

Les dispositifs d'enregistrement continu des variations de température aux diverses profondeurs sont un autre progrès récent. Un de ces instruments emploie le courant électrique, alors qu'un autre emploie un liquide volatile très sensible aux variations de température. Ce liquide est logé dans un récipient et toute variation de pression de vapeurs est enregistrée par un manom ètre ordinaire pour la mesure des pressions souterraines.

Cette nouvelle méthode d'obtention des tempéra-

(Continué sur Page 191)

de pozo. Bajo estas condiciones se observó que a medida que la corriente ascendente de líquido de perforación pasaba por las superficies de mayor sección diametral, se reducía su velocidad y proporcionalmente se reducía también la capacidad transportativa del flúido. Esta acción tenía la tendencia a separar las arenas y partículas más grandes, dejándolas detrás, alojadas en la parte hundida o cóncava del hoyo. Debido a la acumuloción de estas partículas más grandes, se iba formando una proyección o puente en el espacio circular alrededor del tubo de perforación, acumulación que servía de tapón para detener las partículas más pequeñas, que iban en la corriente ascendente. Esta reducción en la velocidad de la corriente ascendente causó gradualmente una creciente acumulación de arena y partículas debajo de la proyección o puente formado, obturando el paso. Estas partículas apretadas quedaron aquí firmemente aprisionadas por la misma corriente ascendente, y con el tiempo, la presión ejercida sobre el exterior del tubo de perforación fué suficiente para impedir su movimiento.

La fuerza de adherencia ejercida por esta acumulación paralizante de arena y partículas puede calcularse según la fórmula siguiente:

$$\frac{S\ P}{DL} \text{ Libra por pulgada cuadrada}$$

D diámetro exterior del tubo en pulgadas cuadradas.

L longitud adherida, en pulgadas.

P presión efectiva en libras.

S esfuerzo cortante interfacial en libras por pulgada cuadrada.

Por informes de campo, se sabe que en muchos casos se ha logrado soltar los tubos o los forros atascados en el hoyo después de haber parado intencional o accidentalmente las bombas. Los experimentos de laboratorio mostraron que la acción apretadora o de retención debajo de la proyección o puente permanecía efectiva, paralizando el tubo, mientras se mantenía la presión de la bomba. Cuando se paraba o moderaba la velocidad de la corriente ascendente, la fuerza de gravedad causaba la separación y caída de la arena y partículas apiladas debajo del puente, soltándose, al mismo tiempo, el tubo atascado. Los experimentos mostraron también que el sacudimiento del tubo no servía sino para facilitar más aún la acumulación de partículas a su alrededor. De igual manera se demostró, en muchos casos, que el sacudimiento del tubo de perforación podía separar las partículas amontonadas, permitiendo el movimiento del tubo.

En vista de todos estos experimentos, se ha llegado a la conclusión de que al atascarse el tubo, mientras prosigue la circulación, lo primero que debe hacerse es cerrar las bombas, para cortar la presión de la corriente ascendente. Si ésto deja de producir el resultado deseado, se recomienda entonces una alternación de partidas y paradas de la bomba. El tubo de perforación puede también golpearse levemente, o tapando repetidamente el tubo de succión o aspiración de la bomba, puede producirse el efecto de un martillo hidráulico.

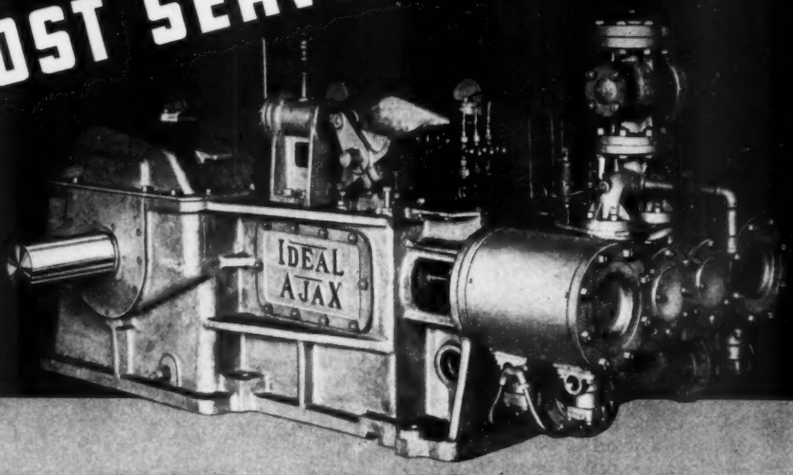
TRANSPORTE DE MAQUINARIA PERFORADORA

El equipo de perforación de pozos modernos se ha simplificado tanto, que ahora es posible montar cada pieza en un soporte a propósito y transportarla como unidad completa. Como se ha reducido mucho el tiempo requerido para perforar pozos, se presenta la necesidad de trasladar con frecuencia este equipo de un punto a otro. El contratista de trabajo de perforación no recibe beneficios de su inversión en el equipo mientras su maquinaria está en tránsito. Por esta razón, le interesa mucho descubrir la manera más fácil, rápida y segura de transportarlo de un punto a otro. Por estas mismas rezones, las herrimientas de la compañía explotadora deben también transportarse con rapidez.

Para la realización de estos resultados, se siguen ahora uniformes métodos de preparación e instalación. Los detalles se estudian y coordinan generalmente en la oficina técnica. Se prepara aquí un juego de planos que indican exactmente el punto en que ha de colocarse cada parte del equipo, en

(Continué en Página 191)

FOR LOW-COST SERVICE



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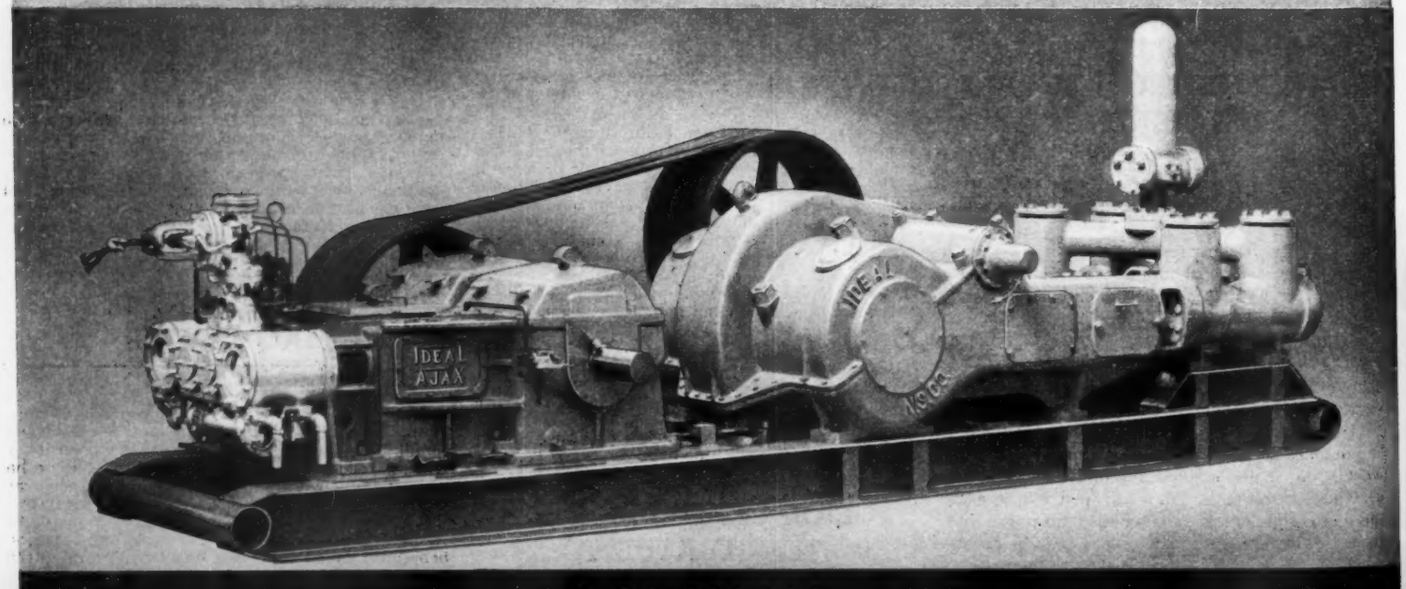

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AQUAGEL

Research has proved that water greatly reduces the oil permeability of production sands. This reduced permeability not only temporarily—but perhaps permanently—reduces the flow of oil into the hole. It is therefore essential to use a colloidal drilling mud in low-pressure areas, which will prevent water from entering producing formations and which will also deposit a very thin cake on the walls of the hole which can be easily removed through the perforations in the liner when the well is swabbed.

It is common practice among many large operators to use a straight AQUAGEL-water mud weighing about 8.7 pounds per gallon (65 pounds per cubic foot) for drilling in. They find that wells swab on production and clean up quicker—and many feel that the ultimate recovery from the well is greater.

Each ton of AQUAGEL produces as much as 150 barrels of excellent drilling mud, depending on the mixing water. This high yield makes the cost per barrel lower than that of most native clays. Moreover, this high yield in barrels of mud per ton assures important economies in transportation, handling and storage costs.

AQUAGEL is not only a better mud—but a less expensive mud!

Certaines recherches ont démontré que l'eau réduit considérablement la perméabilité des roches imprégnées de pétrole. Cette réduction—non seulement temporaire, mais probablement permanente—de la perméabilité, diminue le courant du pétrole vers le puits. Il est donc essentiel d'utiliser une boue colloïdale pour le forage dans les régions a faible pression; une telle boue empêche l'eau de pénétrer dans les roches imprégnées et de plus dépose sur les parois du puits une couche mince qui peut être facilement éliminée par les perforations dans le "tube perdu" quand le puits est soumis au "pistonnage."

Il est d'usage parmi les principaux entrepreneurs de forage d'employer une boue spéciale AQUAGEL pesant environ 8,7 lbs par gallon. On constate que pour la production, les puits se "pistonnent" mieux et se nettoient plus facilement; par cela même, beaucoup d'entrepreneurs sont d'avis que la quantité de pétrole extraite est ainsi accrue.

Chaque tonne d'AQUAGEL peut produire jusqu'à 150 barrils d'une boue excellente, la quantité variant selon l'eau employée. Cette haute teneur permet un prix de revient au barril moindre que par l'utilisation des argiles régionales. De plus, ceci permet une économie importante sur les prix de transport, de manutention et de stockage.

AQUAGEL est une boue qui, non seulement est meilleure, mais coûte moins cher!

Investigaciones científicas han comprobado que el agua reduce la permeabilidad de las estratas productoras de petróleo. Esta mermada permeabilidad reduce las emanaciones del petróleo en el hoyo no solamente de momento, sino que permanentemente. Por consiguiente, es indispensable usar durante la obra de perforación en las zonas de baja presión, un barro coloide gelatinoso a fin de evitar que el agua penetre las estratas productoras. Este barro amorío servirá para formar una costra protectora muy fina en las paredes del hoyo, la cual será fácil de disolución por medio de las perforaciones del forro durante la limpieza del pozo.

La práctica común entre los mejores perforadores es usar, antes de horadar la estrata productora, puro barro AQUAGEL de 8.7 libras de peso por galón (65 libras por pie cúbico). Estos han descubierto que los pozos se pueden limpiar con mejores resultados aún durante progresa la producción. Muchos creen también que la producción al fin alcanza a ser mayor.

Cada tonelada de AQUAGEL produce hasta 150 barriles de barro excelente de acuerdo con la cantidad de agua que se use en la mezcla. Este rendimiento hace que el precio por barril sea más barato que la mayoría de los barros en uso. Además, el número crecido de barriles de barro por tonelada garantiza gran economía en transporte, descarga y gastos de almacenamiento.

AQUAGEL no es solamente un barro superior, sino que es también mucho más económico.

STABILITE

STABILITE is unexcelled for reducing the viscosities of thick drilling muds and at the same time enhancing their wall-building properties—and for freeing gas. It quickly releases gas from gas-cut muds and maintains a workable viscosity in highly weighted muds. STABILITE presents no hazards in mixing or handling and assures lower mud-treating costs. Sold in 50-gallon drums or in powdered form in 10-pound cans. One hundred pounds of powder is equivalent to a 50-gallon drum of liquid STABILITE.

BAROID PRODUCTS

BAROID—Extra-Heavy Drilling Mud.
AQUAGEL—Trouble-Proof Colloidal Drilling Mud.
STABILITE—An Improved Chemical Mud Thinner.
BAROCO—An Economical Salt Water-Resisting Drilling Clay.
FIBROTEX—For Preventing Or Regaining Lost Circulation In Drilling Wells.

STABILITE n'a pas son pareil pour réduire la viscosité des boues épaisses de forage et pour renforcer en même temps leur propriété de consolider les parois du puits, aussi bien que pour libérer le gaz. Celui-ci s'échappe facilement des boues contenant du gaz occlus et maintient une viscosité suffisante dans les boues très denses. STABILITE ne présente aucun risque au mélange ou à la manipulation et permet de réduire les frais de traitement des boues. Ce produit se vend en fûts de 50 gallons ou en poudre par boite de 10 lbs. Un fût de 50 gallons de STABILITE liquide équivaut à 100 lbs de poudre.

PRODUITS BAROID

BAROID.—Boue de forage extra-lourde.
AQUAGEL.—La boue colloidale de forage par excellence.
STABILITE.—Ingrédient chimique perfectionné pour la dilution des boues.
BAROCO.—Argile économique résistant à l'eau salée.
FIBROTEX.—Pour remédier à une circulation défectueuse au cours du forage.

STABILITE no tiene rival en cuanto a sus cualidades para reducir la viscosidad de barros de perforación espesos, facilitando al mismo tiempo la formación de la capa protectora en las paredes y el libre desprendimiento del gas. Esta tendencia a precipitar el gas mejora y mantiene la viscosidad necesaria de barros saturados y muy espesos. STABILITE no ofrece riesgos algunos en su manipulación durante la mezcla y garantiza la mayor economía en los gastos de preparación del barro. Se vende en tambores de 50 galones o en forma de polvo en cajas de diez libras. Cien libras del polvo equivalen a un tambor de 50 galones de STABILITE líquido.

PRODUCTOS BAROID

BAROID—Barro de perforación bien pesado.
AQUAGEL—Barro Coloide garantizado a no fallar.
STABILITE—Un disolvente químico mejorado para barro.
BARCO—Barro de perforación resistente al agua salada.
FIBROTEX—Para evitar o estimular la circulación durante la perforación.

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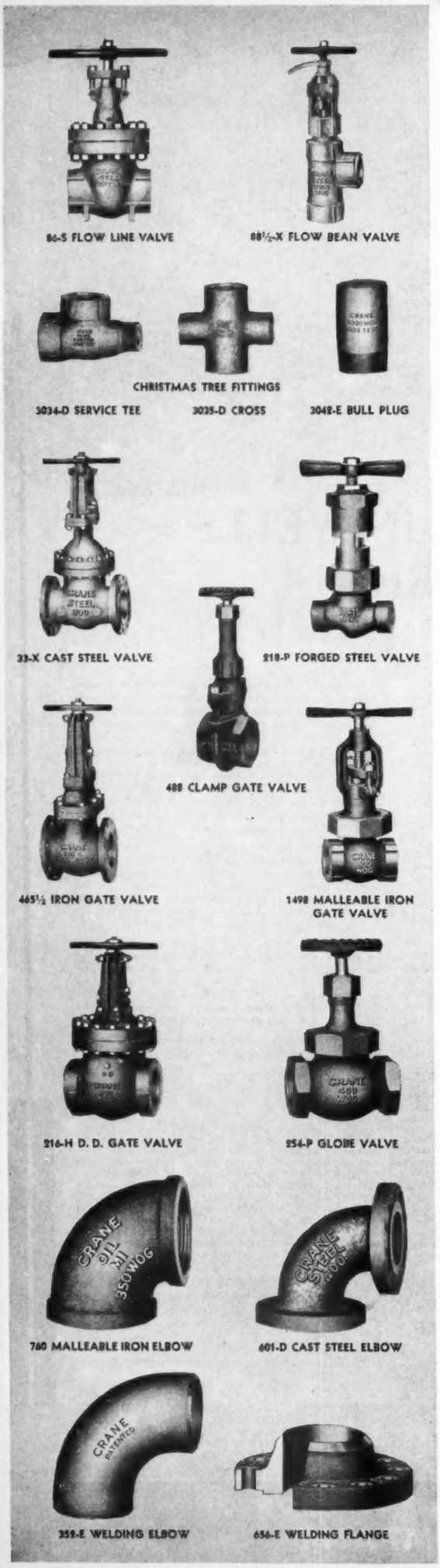

CRANE-EQUIPMENT SERVES THE OIL INDUSTRY— *EVERYWHERE!*

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Aux Etats-Unis et au Mexique—en Russie comme aux Indes—partout où l'on produit du pétrole, on trouve du matériel Crane, employé à contenir le précieux liquide—en contrôlant l'écoulement. Le soin avec lequel tout le matériel Crane est fabriqué—les essais physiques et métallurgiques très serrés auxquels on soumet chaque article en assurent le fonctionnement sûr et efficace dans les emplois pour lesquels ils sont recommandés Les ingenieurs, les préposés à l'entretien et les agents acheteurs en sont venus à voir en le catalogue Crane une source digne de confiance pour tous les articles sans nombre demandés en contrôle pétrolier en matière de vannes et de garnitures.

En los Estados Unidos de América y en México—en Rusia y la India—y en todo país donde se produce petróleo, el equipo Crane se halla protegiendo el precioso líquido—regulando su corriente. El cuidado con que se hace todo equipo Crane—los exigentes ensayos físicos y metalúrgicos a que se somete cada pieza, aseguran un funcionamiento eficaz y digno de confianza en todos los trabajos a que se dedique. Los ingenieros, los directores de mantenimiento y los agentes de compras han llegado a ver en el catálogo Crane una fuente digna de confianza para todas esas numerosas válvulas y conexiones que se emplean en el control del petróleo.

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the new location and placed in its new position so there are the fewest possible moves. By such methods the time required to rig up has been reduced from 10½ days in March 1935, to about 1 to 1.3 days in January 1937. Tearing-down time also has been decreased so equipment actually is making hole a much higher portion of the time.

TEMPERATURE RECORDERS

Devices for recording and logging temperature changes with depth are another recent development. One of these instruments uses electric current and another uses a volatile liquid very sensitive to temperature change. This liquid is confined in a vessel and any variation in vapor pressure is recorded by a regular pressure gauge used for taking subsurface pressures.

This new method of obtaining subsurface temperatures has wide possibilities of application. It is probable its greatest present value is in the definite location of cement behind casing. As cement sets heat is generated and dissipated. This warms the casing and with this instrument it is possible to record these temperature changes from zones where there is cement and zones where there is no cement or where the cement has cooled.

It is also probable that as the instrument is developed and used more commonly it will be possible to note changes in formations because it is a known fact there are differences in temperatures in various formations. With more study it is probable that temperature charts will be developed for areas where the temperature gradients will play an important part in identifying the changes in formations.

SQUEEZE JOBS

Another development used extensively in 1937 is known as the squeeze job in completing and repairing wells. This is essentially a grouting operation, by means of which cement is forced behind the casing through gun perforations. Where several producing formations are penetrated by the same well the casing is run to the bottom of the

ture du sous-sol a de vastes possibilités d'application. Il est probable que le plus grand intérêt de la méthode est actuellement le fait qu'elle permet de situer exactement le ciment derrière le revêtement. En faisant prise le ciment dégage et rayonne de la chaleur, qui se communique au revêtement, et avec cet instrument il est possible d'enregistrer ces variations de température entre zones où il y a du ciment et zones où il n'y en a pas ou encore où le ciment s'est refroidi.

Il est probable aussi que, à mesure que l'instrument se perfectionne et se répand, il sera possible de noter les changements de formations car on sait depuis longtemps qu'il y a des différences de températures entre les diverses formations. Il est probable qu'on arrivera par l'étude à dresser des graphiques de températures pour des régions où les degrés de variation de température joueront un rôle important pour identifier les changements de formations.

TRAVAUX DE COMPRESSION

Un autre progrès qui a trouvé un vaste emploi en 1937 est ce qu'on a appelé "travail de compression" dans l'achèvement et la réparation des puits. Il s'agit essentiellement d'un scellage au ciment par lequel on force du ciment derrière le revêtement à travers de multiples perforations. Quand un même puits pénètre plusieurs formations productrices, on fait descendre le revêtement jusqu'au fond du puits. Etant donné que la position des diverses zones de rapport a été déterminée au préalable, on achève le puits dans l'une quelconque des formations productrices par multi-perforation du revêtement. Afin d'exclure les sections productrices voisines on force tout d'abord du ciment derrière le revêtement au moyen d'autres multi-perforations. Grâce à cette méthode d'achèvement, il est possible de faire produire une formation jusqu'à épuisement, puis de l'obturer par cimentation, puis enfin de multi-perforer le revêtement vis-à-vis de quelque autre couche productrice.

On peut employer l'opération de compression en travaux de réparation, et en perforant le revêtement en des points au-dessus et en-dessous de l'espace où l'on désire forcer du ciment il est possible de cimenter des sections qui n'avaient pas été cimentés d'une manière satisfaisante la première fois.

Par la même méthode générale, on peut sceller des sables à teneur en eau salée, mettre en place et cimenter des chemises perforées et réparer tout revêtement qui fuit. On emploie pour ce genre de travail une boue de ciment de 14 à 16 livres au gallon. On la refoule par pompe dans le puits et elle s'échappe à travers les multi-perforations, produisant les résultats désirés dans ce genre de travail.

relación con la posición del pozo y de cada otra maquinaria del trabajo.

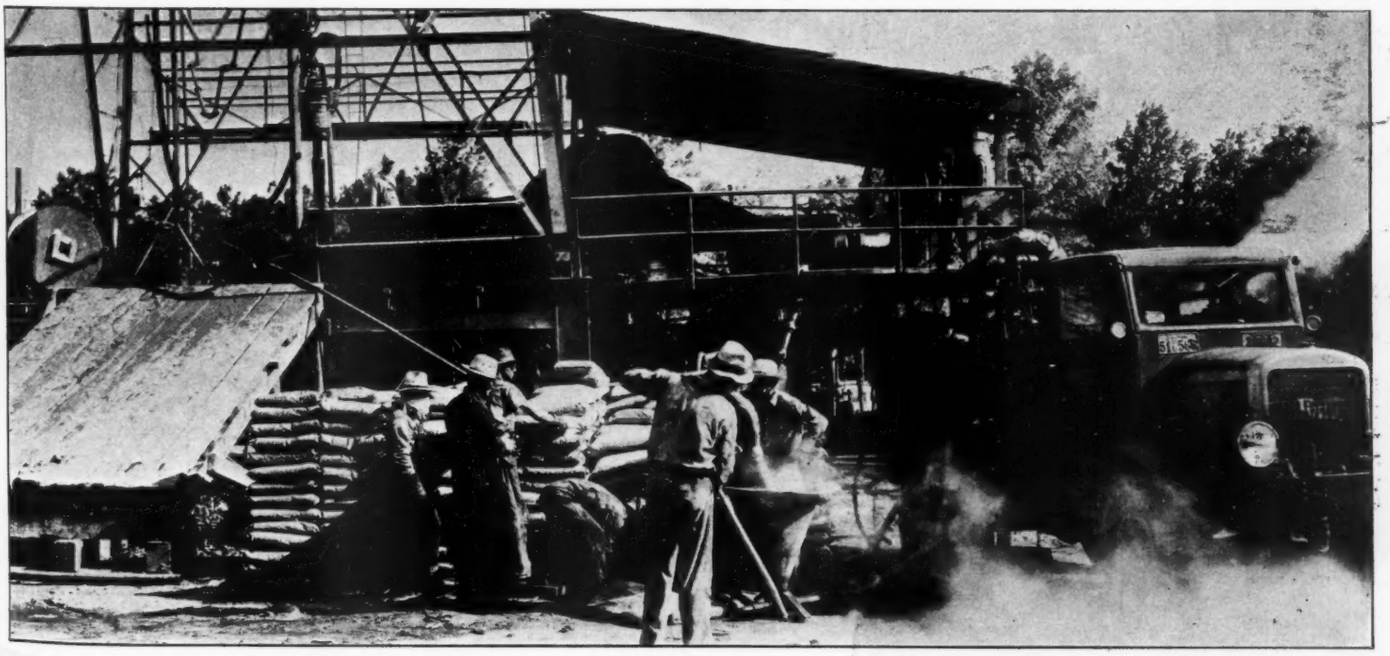
A continuación de los planos de la instalación, el paso siguiente es determinar, sobre una base racional y sistemática, el material por transportarse en cada camión, estableciendo la consecución progresiva de las operaciones del transporte de todo el equipo. Como los camiones de trabajo pesado, que se utilizan hoy día, en los campos petrolíferos, están provistos de montacargas y grúas, es posible cargar en ellos cualquier unidad de equipo de perforación, en un mínimo de tiempo. Este trabajo se lleva a cabo de acuerdo con un programa muy bien estudiado y coordinado. Cada unidad es transportada al nuevo lugar y colocada aquí en el punto que se le ha asignado de antemano, con el menor número posible de movimientos. Gracias a estos métodos racionales, el tiempo requerido para la preparación e instalación de la maquinaria ha sido reducido de 10½ días, en marzo de 1935, a un período de 1 a 1,3 día, en enero de 1937. También se ha reducido considerablemente el tiempo invertido en la misma perforación o sondaje. Por esta razón, el equipo queda ocupado la mayor parte del tiempo.

REGISTRADORES DE TEMPERATURA

Los aparatos para registrar y anotar consecutivamente los cambios de temperatura de acuerdo con la profundidad, representan otro nuevo desarrollo. Uno de estos instrumentos funciona con corriente eléctrica, y otro, con un líquido volátil muy sensitivo al cambio de temperatura. Este líquido está confinado en un receptáculo y toda variación en presión de vapor es registrada por un manómetro de presión ordinario, igual al empleado para presiones subterráneas.

Este nuevo método de determinar las temperaturas del subsuelo ofrece muchas posibilidades de aplicación. Probablemente, su principal valor actual está en su aplicación a la determinación exacta de la posición del cemento detrás del revestimiento metálico. El cemento, al endurecerse, genera calor, que se disipa. Esto calienta el revestimiento y con este instrumento es posible registrar estos cambios de temperatura en las zonas que tienen cemento, en las zonas sin cemento y en secciones donde el cemento se ha enfriado.

También es muy probable que a medida que se perfeccione y se difunda más el uso de este instrumento, será posible utilizarlo para observar cambios en la formación, pues es notorio el hecho de que hay diferencias en temperatura en varias formaciones. Con más estudio es probable que se desarrollen tables de temperatura para regiones en



Running cement behind casing in rotary drilled well *Introduction de ciment derriere le revetement dans un puits fore au rotatif*
Inyeccion de cemento detras del revestimiento de un pozo perforado por rotativa

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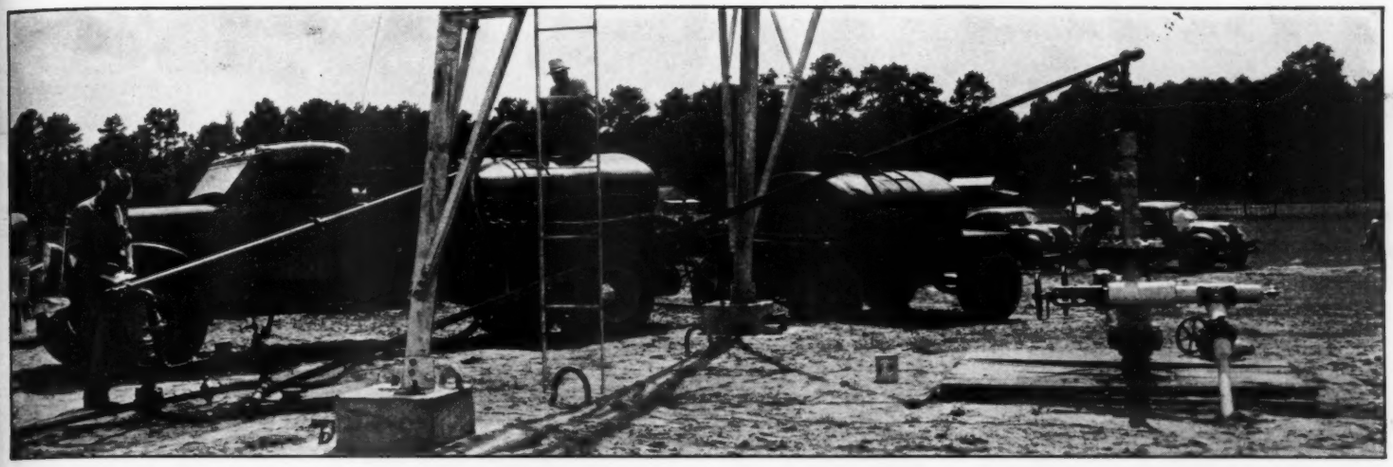


Acidizing a limestone producer *Traitement acide d'un gite producteur calcaire* *Acidificacion de una formacion calcarea*

hole. As the position of the various pay zones has been determined previously, the well is completed in any one of the producing formations by gun-perforation of the casing. To shut off other producing horizons cement first is forced behind the casing through other gun perforations. By this method of completion it is possible to produce a formation to depletion and then cement it off and gun-perforate the casing opposite some other producing stratum.

The squeeze job may be used in repair work, and by perforating the casing at points above and below the space into which it is desired to force cement it is possible to cement sections that had not been cemented satisfactorily in the first instance.

By the same general method salt-water sand may be sealed, perforated liners may be set and cemented, and leaky casing can be repaired. A cement slurry of 14 to 16 pounds per gallon is used for this kind of work. It can be pumped into the hole and escape through the gun perforations, giving the desired results in work of this kind.

ACIDIZING

The use of hydrochloric acid for increasing the productivity of limestone wells has become an established practice in the oil industry. Now another use for chemicals has been found and applied to reconditioning operations and particularly to removing mud sheaths formed over the sand during drilling operations, clearing the hole of carbonate scale deposited from well water and dissolving waxy asphaltic residues deposited by crude oil. This work has been carried on extensively in California, where very thick sand bodies exist and where it has been necessary to work over many of the wells to increase the rate of production.

To remove the mud cake from the face of the sand it has been found by chemical research workers that a strong, highly ionized or alkaline solution will flocculate mud due to their effect on the ph value (hydrogen ion concentration). It is now common practice to wash the sand face with strong inorganic acids with or without a wetting agent, or use semineutral electrolytes with or without organic solvents. A neutral aqueous dispersion of solvents with a wetting agent or a mixture of soda ash and caustic plus acid with heat and carbon dioxide evolution is a second method. The third chemical wash is made of an alkaline solution of strong caustic compounds plus water and is used with or without the evolution of heat.

As the chief constituent of common scale deposited in oil wells in California is calcium carbon-

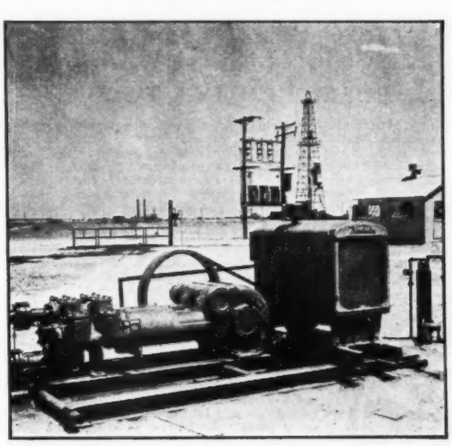
(Continued on Page 198)

TRAITEMENT AUX ACIDES

L'emploi de l'acide chlorhydrique aux fins d'augmenter la productivité des puits calcaires est devenu une pratique établie dans l'industrie du pétrole. Or un autre emploi des produits chimiques vient d'être trouvé et appliqué aux opérations de remise en état et notamment à la destruction des gaînes de boue qui se forment au-dessus du sable pendant le forage, ce qui nettoie le puits des dépôts de carbonate provenant de l'eau de puits et dissout les résidus cireux asphaltiques déposés par le pétrole brut. Ce travail a été fait sur une grande échelle en Californie où il y a des sables très épais et où il a souvent été nécessaire de reprendre un bon nombre des puits aux fins d'en augmenter le rendement.

Pour enlever le gateau de boue à la surface du sable, on a découvert au laboratoire qu'une forte solution très ionisée ou alcaline a la propriété de floculer la boue par suite de son effet sur la valeur ph (concentration en ion hydrogène). Il est maintenant d'un usage courant de laver la surface du sable avec des acides inorganiques forts avec ou sans agent de mouillage, ou d'employer des électrolytes semi-neutres avec ou sans solvants organiques. Une diffusion aqueuse neutre de solvants avec un agent de mouillage ou un mélange de soude calcinée et caustique plus de l'acide avec dégagement de chaleur et de gaz carbonique est une seconde méthode. Le 3ème lavage chimique est avec une solution alcaline de composés caustiques forts plus de l'eau, et il se fait avec ou sans dégagement de chaleur.

(Continué sur Page 198)



Typical small out-door pipe line gathering pump powered by internal combustion engine

Petite pompe exterieure typique de centralisation de pipe-lines actionnee par moteur a combustion interne

Tipica bomba de recoleccion pequena de sistema de tuberia al exterior, provista de motor de combustion interna

que las variaciones de temperatura desempeñen importante papel en la identificación de cambios en las formaciones.

TRABAJOS DE TAPADURA

Otro procedimiento, seguido extensamente en 1937, en conexión con la terminación y reparación de pozos, es el llamado trabajo de tapadura u obturación. Escencialmente, esta es una operación de tapar con cemento, inyectándose este material por detrás del revestimiento, a través de orificios hechos con martillo perforador. Cuando el pozo pasa por varias formaciones productivas, el revestimiento se corre hasta el fondo del agujero. Como la posición de las zonas productivas ha sido previamente determinada, el pozo puede completarse en cualquiera de ellas, horadando el revestimiento con un martillo perforado. Para cerrar otras productivas, se inyecta primero cemento por detrás del revestimiento, a través de otras horadaciones hechas con el martillo perforador. Gracias a este método de terminación, es posible explotar una formación hasta su agotamiento y luego taparlo con cemento, horadando después, con el martillo perforador, el revestimiento al frente de otra estrata productiva.

El trabajo de tapadura puede también aplicarse a obras de reparación. Perforando el revestimiento arriba y abapo del espacio dentro del cual se desea inyectar cemento, es posible cementar secciones que no fueron bien cementadas al principio.

Por este mismo método general, las arenas con agua salada pueden taparse, forros perforados fijarse y cementarse, y revestimientos con escape repararse. Para esta clase de trabajo se usa una lechada de cemento de 14 a 16 libras por galón. Puede inyectarse con bomba en el agujero y pasa muy bien por las horadaciones hechas con el martillo perforador, dando buenos resultados en trabajos de esta clase.

ACIDIFICATION

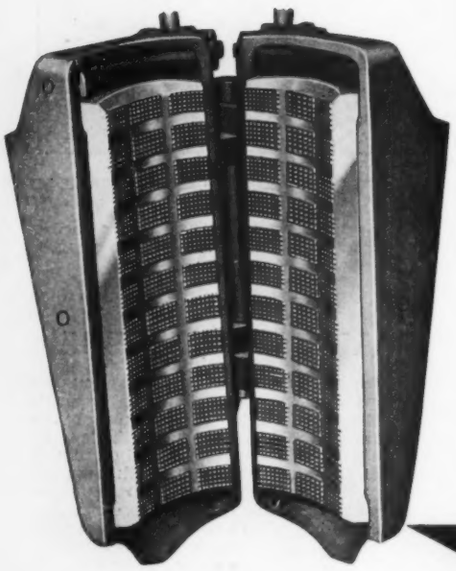
El uso del ácido hidroclórico, para aumentar la productividad de los pozos cacáreos, se ha establecido como práctica corriente, en la industria del petróleo. Ahora, otro uso para substancias químicas se ha descubierto y aplicado a trabajos de reacondicionamiento, particularmente en conexión con el desprendimiento de las costras o forros de barro, que se adhieren a la arena, durante la perforación, despejo de la capa de carbonatos precipitados del agua del pozo, que se pega al agujero y disolución de los residuos asfálticos cerosos, que deposita el petróleo crudo. Este trabajo se está llevando a cabo, en grande escala, en California, donde se presentan zonas arenosas muy gruesas y es necesario reacondicionar muchos de los pozos para aumentar su velocidad de rendimiento o producción.

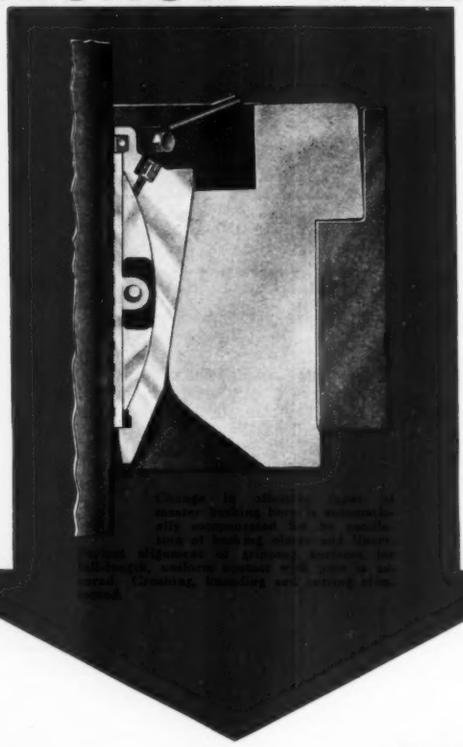
Para quitar la costra de barro de la cara de la arena, los peritos químicos han visto que una solución alcalina bien fuerte o grandemente ionizada produce un efecto separativo sobre el barro, debido a la influencia del valor ph (concentración del ión de hidrógeno). Es ahora práctica

(Continué en Página 198)

BAASH-ROSS

DRILL PIPE PROTECTION—WHERE YOU NEED IT





BAASH-ROSS *Self-Aligning* ROTARY SLIPS

AUTOMATICALLY COMPENSATE FOR CHANGE IN TAPER OF THE MASTER BUSHING BORE

NEW OPERATING PRINCIPLE ELIMINATES CONCENTRATION OF PRESSURE ON SMALL AREA OF PIPE

Because of the exclusive self-aligning principle, these rotary slips automatically compensate for the change that occurs in the effective included taper of the master bushing bore, due to wear and other causes. (See cross section view above.) The liners are laterally supported in the body by curved backing plates. As the slips are applied, the liners oscillate and automatically align themselves perfectly with the vertical axis of the pipe in any position. Thus, the weight of the pipe is not concentrated on a small area, but is uniformly distributed over the entire gripping surface of all of the liners. The pipe is not crushed or kneaded, and cannot creep through the slips. The truncated-pyramid gripping surface of the liners does not cut or mar the pipe. When worn, the liners are quickly replaced at the well, without special tools.

NUEVO PRINCIPIO DE OPERACION EVITA LA CONCENTRACION DE LA PRESION EN UNA PEQUEÑA SUPERFICIE DEL TUBO

Debido al exclusivo principio de alineación automática, estos sujetadores rotativos compensan automáticamente el cambio que ocurre en la conicidad efectiva incluida del diámetro del buje principal, debido a desgaste u otras causas. (Véase la vista seccional mostrada arriba.) Los revestimientos o forros están lateralmente soportados en el cuerpo por placas de refuerzo curvas. Al aplicarse los sujetadores, los revestimientos oscilan y se alinean automáticamente con el centro vertical del tubo en cualquiera posición. De este modo, el peso del tubo no se concentra en una superficie pequeña, sino que queda uniformemente distribuído por la completa superficie de adhesión de todos los revestimientos o forros. El tubo no es aplastado ni molido y no puede correrse por los sujetadores. La superficie de adhesión o agarro, en forma de cono truncaco, de los forros, no corta ni daña al tubo. Una vez desgastados, los forros o revestimientos pueden renovarse rápidamente en el pozo, sin necesidad de herramientas especiales.

El cambio en conicidad efectiva del diámetro del buje principal se compensa automáticamente por la oscilación de las placas de refuerzo y los forros. Se asegura así una alineación perfecta de las superficies de adhesión en contacto uniforme y completo con el tubo. Se evita todo daño debido a aplastamiento, moledura y rotura.

UN NOUVEAU PRINCIPE D'EXPLOITATION ELIMINE LA CONCENTRATION DE PRESSION SUR UNE PETITE SURFACE DE TUYAU

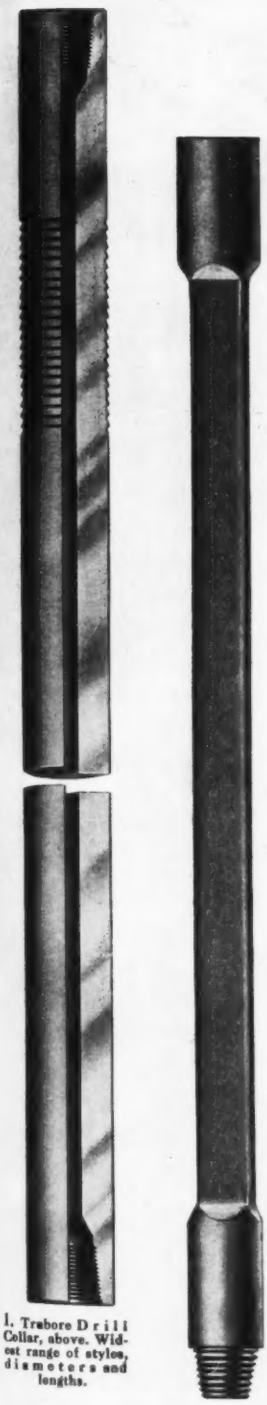
Grâce au principe auto-aligneur spécial, ces fourreaux rotatifs compensent automatiquement pour le changement qui se produit dans la conicité incluse effective de l'alésage du coussinet principal, par suite de l'usure et d'autres causes. (Voir vue en coupe ci-dessus). Les chemises sont soutenues latéralement dans le corps par des plaques d'appui courbées. Lors de la pose des fourreaux, les chemises oscillent et s'alignent automatiquement d'elles-mêmes en parfaite coincidence avec l'axe vertical du tuyau dans toute position. Ainsi le poids du tuyau n'est pas concentré sur une petite surface, mais est uniformément réparti sur toute la surface d'adhérence de toutes les chemises. Le tuyau n'est pas écrasé ou pétri, et ne peut pas cheminer le long des fourreaux. La surface d'emprise en pyramide tronquée des chemises ne peut ni entailler ni mater le tuyau. Une fois usées, les chemises se remplacent facilement au puits sans outils spéciaux.

Tout changement dans la conicité effective de l'alésage du coussinet principal est compensé automatiquement par oscillation des plaques d'appui et des chemises. L'alignement parfait des surfaces d'emprise pour contact uniforme, de toute la longueur, sur le tuyau assuré, et l'écrasement, le pétrissage ou l'entaillage éliminés.

BAASH ROSS TOOL CO.

SEND FOR THE NEW BAASH-ROSS CATALOG

SAFE-MODERN OIL TOOLS



1. Trubore Drill Collar, above. Widest range of styles, diameters and lengths.

2. Trubore Forged Upset Kelly. Accurately forged to true size.

BAASH-ROSS
OIL TOOLS FOR WORLD-WIDE SERVICE

Practical oil men, working with engineers skilled in oil field practice, designed and perfected the drilling tools, fishing tools and other Baash-Ross equipment shown on this and the following pages. Years of safe, successful operation in oil fields throughout the world have proved them to be correct in principle, safe in operation, and economical. In addition to the standard designs shown in these illustrations, the Baash-Ross Tool Company manufactures an extensive line of special tools of proved merit for unusual applications. Your inquiries are solicited.

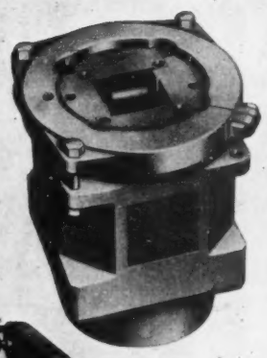
HERRAMIENTAS BAASH-ROSS PARA TRABAJOS PETROLEROS EN TODO EL MUNDO

Hombres prácticos en la explotación del petróleo, con la cooperación de ingenieros especialistas en los procedimientos técnicos de la industria petrolera, han ideado y perfeccionado las herramientas Baash-Ross para perforar, pescar y otros trabajos del ramo, que se presentan en esta página y las siguientes. Años de funcionamiento seguro y satisfactorio, en los campos petrolíferos de todo el mundo, han demostrado que son correctas en principio, seguras en operación y económicas en todo sentido. Además de los modelos normales, que mostramos en los presentes grabados, fabricamos un extenso surtido de herramientas especiales de méritos establecidos, para aplicaciones extraordinarias. Sírvase pedirnos información.

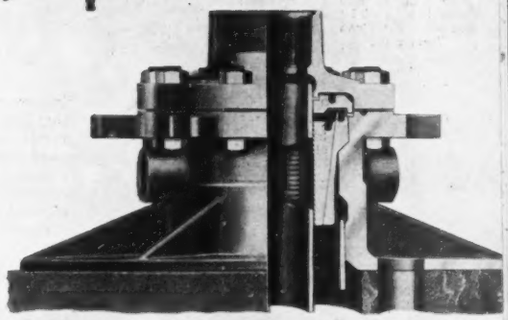
OUTILS PETROLIERS BAASH-ROSS POUR SERVICE MONDIAL

Ce sont des ouvriers pétroliers entraînés dans la pratique et des ingénieurs habiles dans la partie qui ont conçu et perfectionné les outils de forage, les outils de repêchage et autre matérial Baash-Ross qu'on voit ici et sur les pages qui suivent. Des années de service sûr et excellent dans les champs de pétrole du monde entier ont prouvé qu'ils sont à la fois rationnels, sûrs et économiques. En plus des types standard représentés sur les clichés, la Baash-Ross Tool Co. fabrique une vaste série d'outils spéciaux de mérite prouvé pour emplois peu courants. Vous êtes invité à nous interroger.

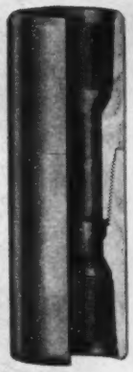
3. Roller Kelly Drive Bushing provides maximum driving surface with minimum friction.



4. Pipe Slotter. Enables operator to manufacture own screen pipe. Makes tapered slot; narrow outside, wider inside.



5. Casing and Landing Heads for all hook-ups. Use of interchangeable parts promotes economy.



6. Regular and Full Hole A.P.I. Tool Joints with milled threads.

7. Quick acting, Positive Seal Blowout Preventer.

Please TURN PAGE·

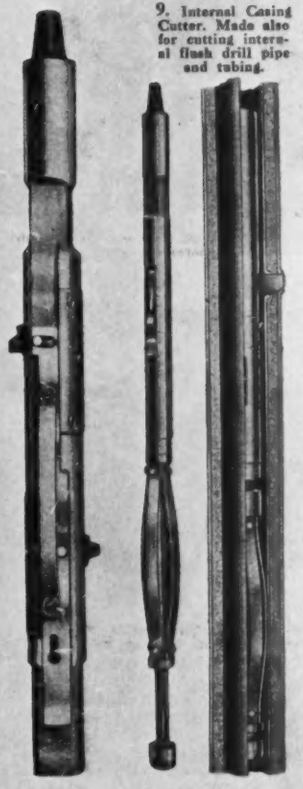
A la vuelta

Tournez la page S.V.P.

BAASH-ROSS s

8. External Drill Pipe Cutter. Has interchangeable parts to cut flush joint pipe.

9. Internal Casing Cutter. Made also for cutting internal flush drill pipe and tubing.



10. Star Wheel Perforator. Rotary and Cable Tool types perforate single string of casing.

11. Long Knife Perforator for penetrating two strings of pipe with cement between them.

BAASH-ROSS TOOLS
ARE DEPENDABLE

In design, construction and operation Baash-Ross oil tools are kept thoroughly up-to-date by continuous engineering research and observation during use in the field. Parts subject to strain in operation are constructed with an ample safety factor, and wearing parts are easily replaced when required. Their dependability is demonstrated daily in every active oil field at home and abroad.

The cutting and fishing tools shown here are available in the United States on a rental basis, operated by experienced Baash-Ross service men. These tools are sold for export, and each shipment is accompanied by complete instructions for the proper operation and care of the tools. Thus, operators everywhere are assured of full satisfaction in their use.

LAS HERRAMIENTAS BAASH-ROSS PARA TRABAJOS PETROLEROS SON DIGNAS DE CONFIANZA

En tipo, en construcción y en funcionamiento, las herramientas Baash-Ross para trabajos petroleros se conservan modernas en todo sentido, gracias a contínuos estudios científicos y observación prolija de la operación en los mismos campos petrolíferos. Las piezas que están sujetas a tensión fuerte en el trabajo se hacen con un amplio factor de seguridad. Las piezas expuestas a desgaste pueden renovarse con facilidad y economía. Su seguridad se está demostrando a diario en los más importantes campos petrolíferos de este país y del extranjero.

Las herramientas de cortar y de pescar que mostramos aquí se ofrecen a los interesados en los Estados Unidos de América sobre una base de arriendo, quedando manejadas por expertos mecánicos entrenados en la fábrica. Estas herramientas se venden, sin embargo, para la exportación, y con cada embarque enviamos instrucciones completas para su correcto manejo, operación y conservación. De este modo, el dueño en el extranjero cuenta con la seguridad de recibir completa satisfacción de todas estas herramientas.

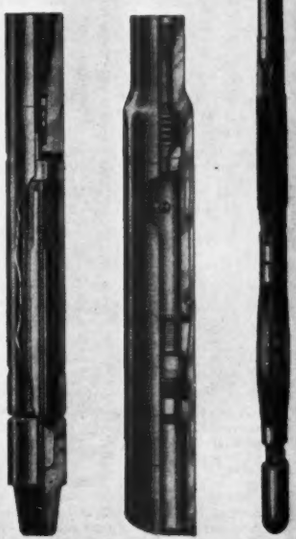
LES OUTILS PETROLIERS BAASH-ROSS SONT DE TOUT REPOS

En tracé, construction et fonctionnement, les outils pétroliers Baash-Ross sont maintenus tout à fait à jour par des recherches techniques continues et des observations dans la pratique du chantier. Les pièces exposées à la fatigue en service sont prévues avec une ample marge de sécurité, et les pièces qui s'usent se remplacent facilement le cas échéant. Leur fonctionnement de tout repos est prouvé jour après jour en service actif dans les champs de pétrole tant ici qu'a l'étranger.

Les outils de forage et de repêchage qu'on voit ici peuvent s'obtenir aux Etats-Unis sur une base de location, et sous la direction de mécaniciens Baash-Ross expérimentés. Ces outils se vendent à l'exportation, et chaque fourniture est accompagnée d'instructions complètes pour l'emploi et l'entretien corrects des outils. Ainsi, les opérateurs sont partout assurés d'une entiére satisfaction avec leur emploi.

12. Rotary Releasing Spear. Has extra large slip area solidly backed up to withstand severe jarring. Slips positively released under all conditions.

13. Automatic Torque Controlled Rotary Jar. Automatically tripped and reset by raising and lowering pipe.



14. Drive-Down Jar packed off for circulation.

15. Rotary Releasing Socket. Easily adapted to catch pipe, tool joint or coupling.

16. Rotary Releasing Tubing Spear.

BAASH TOOL CO. ROSS

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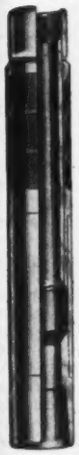
PIDA POR EL NUEVO CATALOGO BAASH-ROSS

SAFE - MODERN OIL TOOLS



17. Bottom Hole Packer commonly used to pack-off above perforated liner.

18. Autolock Safety Joint provides positive emergency release of fishing string.

19. Packing Casing Bowl effects tight connection of casing strings in repair work.

20. Packing Liner Hanger suspends liner and securely packs off in casing.

21. Liner Setter (left) insures safety in setting and subsequent pulling of liners.

BAASH-ROSS TOOLS
SAVE MONEY FOR YOU

The long, safe service rendered by a Baash-Ross oil tools is insured by employing the most suitable materials, accurate machining methods, carefully controlled heat treating, and thorough inspection and testing of the finished products. These factors result in actual saving of money for the operator, whether his well is near sources of supply or in an isolated locality. The need for replacement of parts is greatly reduced and maintenance work is simplified. Baash-Ross manufacturing methods assure ready interchangeability of parts and uniformity of performance.

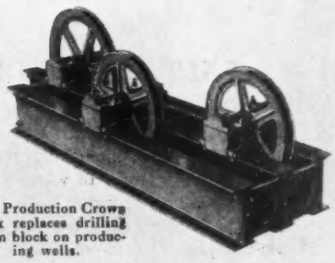
LAS HERRAMIENTAS BAASH-ROSS PARA TRABAJOS PETROLEROS LE AHORRARNA DINERO

El prolongado y seguro servicio rendido por las herramientas Baash-Ross se asegura por el empleo de los materiales más adecuados, los métodos fabriles más exactos, tratamiento térmico cuidadosamente gobernado y un sistema de minuciosas inspecciones y ensayos de los productos terminados. Todos estos factores resultan en un verdadero ahorro de dinero para los dueños, cuyos pozos estén próximos a fuentes de abastecimientos o alejados de estas fuentes. La necesidad de piezas de repuesto queda grandemente limitada y el trabajo de conservación resulta muy simplificado. Los métodos fabriles de la Baash-Ross aseguran fácil intercambio de piezas y uniformidad en funcionamiento.

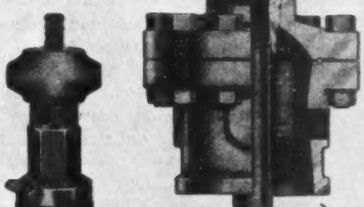
LES OUTILS PETROLIERS BAASH-ROSS VOUS VAUDRONT DES ECONOMIES

Le service sûr et durable rendu par les outils pétroliers Baash-Ross est dû à ce que leur fabricant emploie le meilleur matériel pour ce genre de service, des méthodes d'usinage précises, un traitement thermique réglé avec précision, et une inspection et vérification approfondies des produits finis. Ces facteurs se traduisent par une économie réelle pour l'exploitant, et cela que son puits soit tout prêt de centres d'approvisionnement ou dans une localité isolée. La nécessité de remplacer des pièces est fortement réduite et le travail d'entretien simplifié. Les méthodes de fabrication Baash-Ross assurent une interchangeabilité instantanée des pièces et l'uniformité de fonctionnement.

22. Open End Tubing Spider is installed without breaking flow line connections.



23. Production Crown Block replaces drilling crown block on producing wells.



24. Tubing Head. High and low pressure types for all service conditions.

25. Wire Line Oil Saver automatically seats in body and lifts out on contact with rope socket.

26. Streamline Tubing Block. Available with 1, 2, or 3 sheaves

BAASH-ROSS COMPANY

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New York, N. Y., U. S. A.

ate, it is possible to dissolve the scale by the use of hydrochloric acid. It is usual practice to use an inhibitor with this acid to lower the rate of attack upon the metal in the well.

In some wells it has been found the carbonate scale is practically insoluble in ordinary acid and can be effectively removed only when a suitable wetting agent has lowered the interfacial tension between acid and oil-coated surface, thus permitting penetration of the acid into the carbonate material.

To remove the waxy asphaltic residues it has been found that some heat-producing chemical mixture is best. Such a mixture will cause the accumulation to melt and it then can be bailed or pumped out of the hole. In some instances hot oil has served to loosen this waxy accumulation and increase production. Caustic and aluminum powder are one mixture used successfully to generate heat in the well for cleaning purposes.

SALT WATER DISPOSAL

Practically all oil fields produce an abundance of salt water along with the oil as the wells get older. In some instances it is possible to repair the wells so the volume of water handled is held to a minimum, but in other fields it is necessary to allow the water to come into the well freely in order that it may flush the oil out of the formation.

Wherever salt water is produced the operators are immediately faced with a problem of getting rid of it without damage to others. Fresh-water strata have to be protected against contamination and it is not permissible to dump the salt water into fresh-water streams. In some instances streams flowing adjacent to oil fields are already polluted, and it is not unusual to allow the salt water to drain off into them. However, there are not enough polluted streams in the oil country to make adequate outlet for salt water disposal, so the operators have to devise other means of getting rid of this by-product.

The development of disposal plants is comparatively new, but it offers one of the most logical solutions to this problem. The oil and water are separated in treating tanks on the lease. The water then is delivered to some central treating plant where foreign elements are removed. Many waters carry iron in solution and in suspension. To remove this alum is added and the water then aerated and the iron settles out. If this iron were not removed before the water is returned to the underground formation selected to receive it, the pore spaces in the reservoir rock would be sealed quickly and the plant rendered inoperative.

Other chemicals likely to react with waters already in the formation selected as a disposal reservoir must be treated and either neutralized or precipitated. This problem of water treatment has received much study by the chemist and it is now possible to handle practically any oil-field brine in a satisfactory manner and return it to some underground formation.

To remove the undesired elements it is common practice to use sand filters. These filters are made by selecting a large wooden tank and providing it with a false grid bottom. On this grid bottom broken rock or tile is placed and above a layer of that material gravel is laid down in a relatively thick bed. On top of the gravel a layer of clean sand is placed. The water to be filtered is sprayed on top of this layer of sand and it runs down through it and the lower layers of gravel and coarse rock and escapes into the bottom of the tank. The suspended solids in the water are filtered out and the water is then in a condition to be delivered to the input well.

Input wells selected to receive water to be disposed of usually are located at some place down the

(Continued on Page 204)

Comme l'élément principal des dépôts courants qu'on trouve dans les puits de pétrole de Californie est le carbonate de calcium, il est possible de les dissoudre au moyen d'acide chlorhydrique. Il est d'usage de faire emploi d'un inhibiteur avec cet acide afin que ce dernier ne ronge pas trop le métal dans le puits.

Dans certains puits on a constaté que le dépôt de carbonate est à peu près insoluble dans l'acide ordinaire et ne peut être détruit efficacement que par l'addition d'un agent de mouillage approprié qui réduit la tension interfaciale entre l'acide et la surface enduite de pétrole, ce qui permet à l'acide de pénétrer le dépôt de carbonate.

Pour enlever les résidus cireux asphaltiques, on a trouvé avantage à employer un mélange chimique exothermique. Un tel mélange fait fondre les résidus accumulés qu'on peut alors écoper ou pomper hors du puits. Dans certains cas on a eu recours à de l'huile chaude pour détacher ces dépôts cireux et augmenter la production. Un des mélanges employés avec succès pour dégager dans le puits la chaleur nécessaire au nettoyage consiste de caustique et de poudre d'aluminium.

UTILISATION DES EAUX SALEES

Presque tous les champs de pétrole produisent des eaux salées en abondance avec le pétrole à mesure que les puits deviennent plus anciens. Dans certains cas il est possible de réparer les puits pour maintenir le volume d'eau au minimum, mais dans d'autres champs on est obligé de laisser l'eau venir librement dans le puits pour que la pétrole vienne affleurer en haut.

Là où il y a production d'eaux salées les exploitants sont aussitôt en face du problème de s'en débarrasser sans dommage pour autrui. Les nappes d'eau douce doivent être protégées contre la contamination et on ne peut tolérer qu'on jette des eaux salées dans des cours d'eau. Dans certains cas les rivières qui longent les champs de pétrole sont déjà souillées et il n'est pas rare d'y autoriser l'écoulement d'eaux salées. Toutefois, il n'y a pas assez de cours d'eau souillés dans les régions pétrolières pour servir d'écoulement aux eaux salées résiduaires, de sorte qu'il a fallu imaginer des moyens pour se débarrasser de ce sous-produit.

Ce n'est qu'assez récemment qu'on a conçu des installations de traitement, mais c'est une des solutions les plus logiques de la question. On sépare le pétrole et l'eau dans des réservoirs de traitement au chantier. L'eau est alors livrée à un atelier de traitement central où on élimine les éléments étrangers. Bien des eaux contiennent du fer en solution et en suspension. Pour l'éliminer on ajoute de l'alun, on aère l'eau et le fer se dépose. Si on n'éliminait pas ce fer avant de renvoyer l'eau au gisement souterrain qu'on a choisi, les pores du roc du gisement seraient vite bouchés et toute extraction deviendrait impossible.

Il faut aussi traiter, puis soit neutraliser soit précipiter, tout autre produit chimique apte à réagir sur les eaux déjà dans le gisement choisi comme réservoir dépotoir. Ce problème de traitement des eaux a été étudié sous tous ses aspects par le chimiste et il est maintenant possible de tirer parti d'à peu près toute saumure de champ pétrolier et d'en faire le retour à un gisement souterrain.

Pour éliminer les éléments indésirables il est d'usage courant d'utiliser des filtres à sable. Pour les confectionner on choisit un grand réservoir en bois et on le munit d'un faux fond à grille. Sur ce fond on place du roc ou de la tuile concassée et làdessus une couche assez épaisse de gravier. Audessus du gravier on dispose une couche de sable bien propre. L'eau qu'on veut filtrer est pulvérisée sur cette couche de sable, traverse cette couche puis les couches inférieures de gravier et de morceaux de roc, enfin s'écoule au bas du réservoir. Les solides en suspension dans l'eau sont ainsi retenus et l'eau sort du filtre dans un état qui convient au puits d'entrée.

Les puits d'entrée sélectionnés pour recevoir l'eau dont on veut se débarrasser sont en général à un niveau de la structure où l'eau de bordure est en contact avec la nappe de pétrole. Il se peut que le puits ne se trouve pas à la zone de contact entre l'eau et le pétrole, mais on déverse l'eau résiduaire dans le sable aqueux et non dans la nappe de pétrole. A mesure que cette eau s'accumule elle tend à forcer le pétrole au-dessus d'elle vers le puits et ainsi peut faciliter l'extraction finale. On fore parfois des puits spéciaux pour déverser cette eau,

(Continué sur Page 204)

común lavar la cara de la arena con fuertes acidos inorgánicos con agente remojador o sin él, o usar electrolitos semineutros con disolventes orgánicos o sin ellos. Una dispensión acuosa neutra de disolventes, con un agente remojador, o una mezcla de carbonato sódico anhidro y cáustico, más ácido, con evolución de calor y bióxido de carbono, es un segundo método. Un tercer lavado químico es una solución alcalina de fuertes substancias cáusticas, más agua, empleada con evolución de calor o sin ella.

Debido a que el constituyente principal de la costra que comunmente se deposita en los pozos calcáreos es al carbonato de calcio, es posible disolver esta costra mediante la aplicación de ácido hidroclórico. Con este ácido se emplea generalmente un agente de inhibición, para reducir la fuerza del ataque contra el metal que haya en el pozo.

Se ha visto que la costra de carbonato, en algunos pozos, es casi insoluble en ácido ordinario y sólo puede quitarse efectivamente cuando un adecuado agente remojador ha reducido la tensión interfacial, entre el ácido y la superficie cubierta de petróleo, para permitir así la penetración del ácido en el material de carbonato.

Para quitar los residuos asfálticos cerosos, se ha visto que lo mejor es una mezcla química generadora de calor. Semejante mezcla derrite la acumulación y ésta puede entonces quitarse del agujero por cucharón o por bomba. En algunos casos, el petróleo caliente ha servido para flojar esta acumulación cerosa y aumentar la producción del pozo. La soda cáustica y el polvo de aluminio forman una mezcla que se usa con éxito para generar calor en el pozo, para los fines de limpieza.

UTILIZACION DEL AGUA SALADA

Casi todos los campos petrolíferos producen una gran cantidad de agua salada conjuntamente con el petróleo, particularmente en conexión con los pozos viejos. En algunos casos, es posible reparar los pozos, con el fin de reducir a un mínimo la cantidad de agua por manejarse; pero, en otros casos, es necesario dejar que el agua entre libremente al pozo, para facilitar la salida del petróleo del yacimiento.

Cada vez que se produce agua, los explotadores quedan inmediatamente enfrentando el problema de desprenderse de ella sin daño a otros. Las estratas de agua dulce deben protegerse contra la contaminación y no se tolera el arrojar agua salada en las corrientes de agua dulce. En algunos casos, los riachuelos que pasan adyacentes a campos petrolíferos se hallan ya contaminados y no es raro ver que, por esta razón, se permita desembocar en ellos el agua salada. Sin embargo, en los campos petrolíferos, no hay un suficiente número de corrientes corrompidas para servir de receptáculo a toda el agua salada, y por esta razón, ha sido necesario idear otros medios para desprenderse de este líquido residual.

El desarrollo de instalaciones de tratamiento es álgo comparativamente nuevo, pero ofrece ya una de las soluciones más acertadas del problema. En tanques de tratamiento, en el mismo campo, el petróleo se separa del agua. El agua se entrega en seguida a una instalación central de tratamiento, en la cual se le extraen las substancias extrañas. Muchas aguas llevan hierro en solución o en suspensión, y para su eliminación, se tratan con alumbre. El agua se somete a aeración y el hierro se deposita al fondo. Si no se quitara este hierro antes de la devolución del agua al yacimiento subterráneo elegido para recibirla, la porosidad de la roca de formación se taparía rápidamente imposibilitando toda adicional extracción.

También es necesario tratar, ya neutralizándolas, ya precipitándolas, otras substancias químicas propensas a tener reacción sobre las aguas del mismo yacimiento señalado para su recepción. Este problema del tratamiento del agua ha recibido mucho estudio por parte de los químicos, y ahora es posible manejar la salmuera de casi cualquier campo petrolífero, de una manera satisfactoria, para devolverla inocua al yacimiento subterráneo.

Para eliminar los elementos nocivos, es práctica común emplear filtros de arena. Esta clase de filtro consta de un tanque grande de madera escogida, provisto de un fondo falso, de parrilla. Sobre esta parrilla se coloca roca o loza triturada, y encima de este material, un lecho relativamente grueso de grava o cascajo. Encima del cascajo se coloca una capa de arena limpia. El agua por filtrarse se rocía encima de esta capa de arena y

(Continué en Página 204)

THE correct screen casing
for each individual well serves
to restrain the entrance of sand with the
least resistance to the inflow of oil; and therefore,
permits production of the maximum amount of oil with a
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Through extensive experiments Kobe has accumulated a
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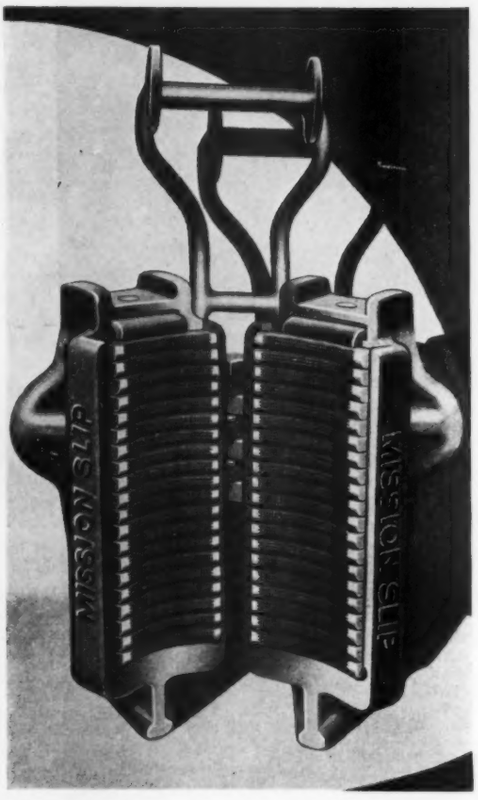


NEW ROTARY SLIPS, TYPE 36

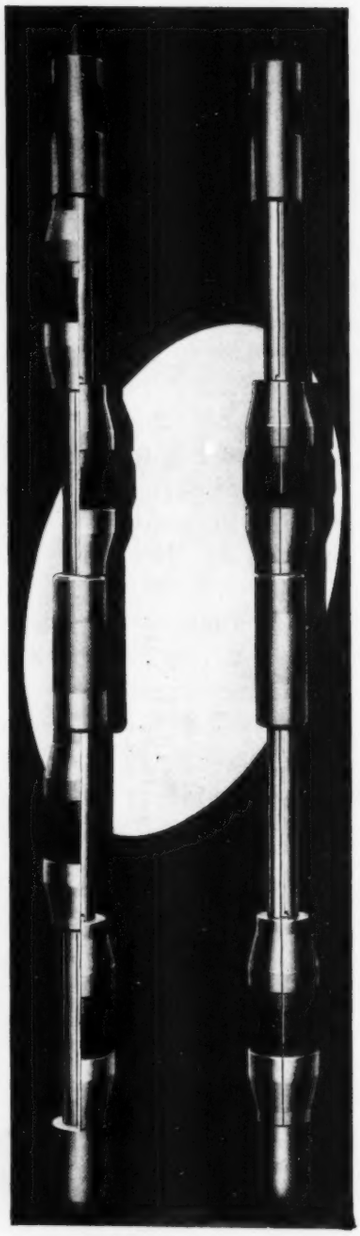
● *Save money by saving pipe.* Unique principle of "rolling dogs" gives gradual, cushioning grip. Prevents cutting or bottle-necking pipe. Insurance against many costly fishing jobs due to damaged pipe.
Speeds up round trips as dogs roll away from pipe as it is pulled.
No costly delays taking slips to shop . . . dogs quickly and easily replaced on derrick floor, putting old slips on a par with new slips in pipe-saving and time-saving performance.
Lightest weight slip. Safer, easier, and faster to handle.

NOUVEAUX FOURREAUX ROTATIFS, TYPE 36

● *Economie d'argent par économie de tuyau.* Le principe unique des "toes roulants" assure un serrage élastique et graduel. Empêche de couper ou de coincer le tuyau. Garantie contre de nombreux travaux de repêchage coûteux par suite de tuyau avarié.
Accélération des trajets dans les deux sens car les toes se dégagent du tuyau par roulement quand on tire sur ce dernier.
Pas de retards onéreux par suite de réparations des fourreaux à l'atelier . . . car on remplace les toes promptement et aisément sur le plancher de derrick, rendant aux anciens fourreaux le rendement de fourreaux neufs en économie de tuyau et de temps.
Fourreau ultra-léger. Maniement plus sûr, plus facile et plus rapide.

NUEVOS SUJETADORES ROTATIVOS, TIPO 36

● *Economía de dinero por economía de tubo.* El principio exclusivo de los "fiadores o barriletes rodantes" asegura un cierre elástico y gradual. Evita cortar o apretar el tubo. Garantía contra los numerosos y costosos trabajos de pesar, a consecuencia de daño al tubo.
Aceleración de los viajes en ambos sentidos, pues los fiadores o barriletes se desprenden el tubo cuando éste se empuja.
No hay retardos costosos en la reparación de los sujetadores en el taller . . . los fiadores o barriletes se reemplazan con rapidez y facilidad en el mismo piso de la torre de perforación, y dan a los sujetadores viejos el mismo rendimiento que tienen los nuevos en economía de tubos y de tiempo.
El sujetador más liviano en peso. Manejo más seguro, más fácil y más rápido.



MISSION VALVELESS SWABS

● *Assure 3 to 15 times faster swabbing* . . . protecting the sand . . . earning quicker profits by getting oil into the tanks quicker.

Unique split-rubber principle: On down stroke, half of each rubber rises above stationary half allowing an area of fluid passage larger than the area around the A.P.I. pin; falls like a plummet. On upstroke, movable half of each rubber drops back beside its other half.

Safer: Gas pressure will open split-rubber, permitting gas to by-pass, resuming its load without loss after gas has passed. *No loose line over derrick floor to endanger crew.*

ECOUVILLONS SANS SOUPAPE MISSION

● *Assurent un écouvillonnage de 3 á 15 fois plus rapide* . . . protégeant le sable . . . gagnant des profits plus rapides en amenant le pétrole plus rapidement dans les réservoirs.

Principe unique à caoutchouc fendu: A la course descendante, la moitié de chaque caoutchouc s'élève au-dessus de la moitié fixe ce qui laisse une surface de passage de fluide plus grande que celle autour du goujon A.P.I.; tombe comme un plomb. A la course remontante, la moitié mobile de chaque caoutchouc retombe à côté de son autre moitié.

Plus grande sécurité: La pression de gaz ouvrira le caoutchouc fendu, laissant les gaz passer en dérivation, puis reprenant sa charge sans perte après le passage du gaz. *Pas de câble détendu sur le plancher de la tour de sondage pouvant mettre l'équipe en danger.*

ESCOBILLONES MISSION SIN VALVULA

● *Asegura un trabajo de 3 a 15 veces más rápido* . . . protegiendo la arena . . . obteniendo ganancias más rápidas, por llevar el petróleo más rapidamente a los tanques o depósitos.

Principio exclusivo de caucho hendido: En la carrera descendiente, la mitad de cada caucho se levanta por encima de la mitad fija, lo que deja una superficie de paso de líquido mucho más grande que la que hay alrededor del pasador A.P.I.; cae como un plomo. En la carrera ascendente, la mitad móvil de cada caucho cae al lado de su otra mitad.

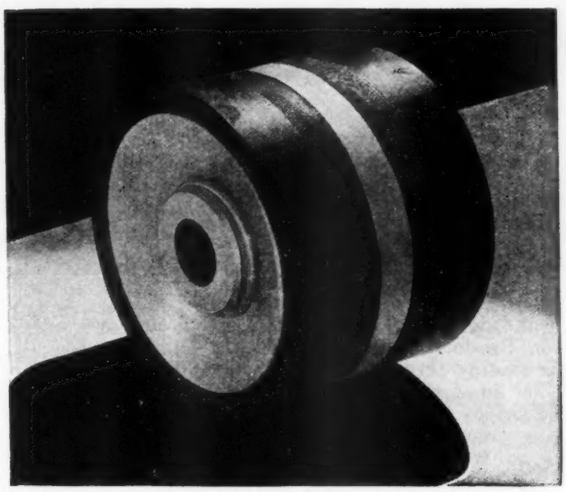
Mayor grado de seguridad: La presión del gas abrirá el caucho hendido, dejando que el gas pase en derivación, recobrando su carga sin ninguna pérdida, después de que el gas ha pasado. *No hay cable suelto sobre el piso de la torre de perforación, que ponga en peligro a los trabajadores.*

MISSION MANUFACTURING CO.

HUMBLE ROAD - - - - HOUSTON, TEXAS

EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK

PRODUCTS
ECONOMY
MAN'S LANGUAGE



NEW MISSION SILVER TOP VALVES
Last 100% longer

● *Wear-taking, removable bushings take the blows instead of the seat.*

Saves money formerly invested in continuously buying new seats for conventional type valves.

Saves labor of changing seats often.

NOUVELLES SOUPAPES DE DESSUS EN ARGENT MISSION
Durée d'emploi double

● *Coussinets amovibles, prenant l'usure, reçoivent les chocs au lieu du siège.*

Economie d'argent qu'on devait jusqu'ici dépenser à l'achat continuel de nouveaux sièges pour les soupapes du type classique.

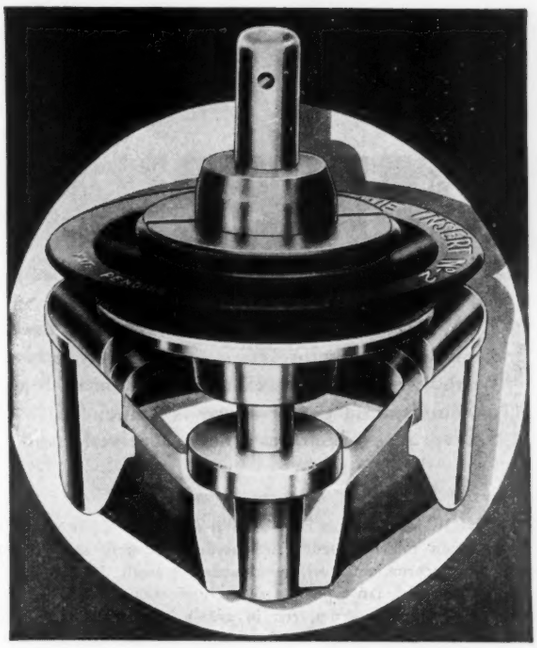
Economie de main-d'oeuvre qui s'imposait pour changer souvent de sièges.

NUEVAS VALVULAS MISSION SILVER TOP
Duran el doble que las corrientes

● *Los bujes amovibles, expuestos al desgaste, reciben los choques, en lugar del asiento.*

Ahorra el dinero que antes se gastaba en la compra contínua de nuevos asientos para las válvulas de tipo corriente.

Ahorra tiempo y trabajo en el frecuente cambio de asientos.



IMPROVED MISSION PISTONS
Cut upkeep costs in half

● *Replaceable rubbers on a long-lasting body* . . . Replaceable on the derrick floor without removing piston from rod.

Drop forged, chrome nickel steel, one-piece construction . . . resists any pressure.

PISTONS PERFECTIONNES MISSION
Frais d'entretien réduits de moitié

● *Caoutchoucs remplaçables sur un corps extra-durable . . .* Remplaçables sur le plancher de tour de sondage sans devoir séparer le piston de la tige.

Construction d'une seule pièce, en acier au nickel-chrome, forgée au marteau-pilon . . . résistant à toute pression.

EMBOLOS MISSION PERFECCIONADOS
Gastos de conservación reducidos a la mitad

● *Cauchos reemplazables en un cuerpo muy durable . . .* Se reemplazan sobre el piso de la torre de perforación, sin necesidad de separar el émbolo de la varilla.

Construcción de una sola pieza, de acero al níquel y cromo, forjada a martinete . . . resistente a toda presión.

MISSION MANUFACTURING CO.

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DOING AN OUTSTANDING JOB IN FOREIGN FIELDS

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PORTABLE RIGS AND OIL FIELD WINCHES

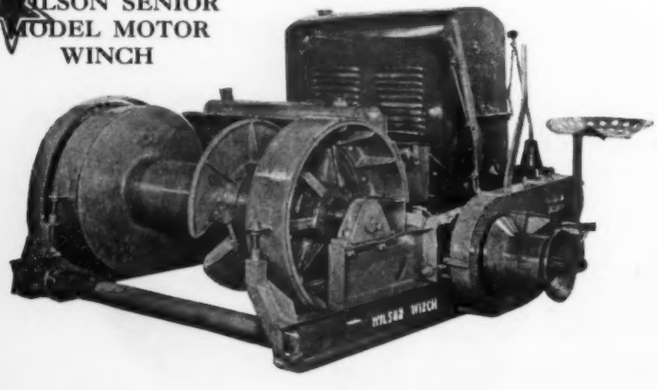
Wilson Portable Rigs and Winches have made a name for themselves . . . in many other parts of the world . . . as well as in the United States. Their outstanding performance is evidenced in the many reorders which have been received from operators in foreign and domestic fields. This is why you can buy Wilson Products with confidence . . . because they are providing greater efficiency, durability and portability at amazingly lower costs. Write for full details and prices of Wilson Rigs and Winches before making your next purchase.

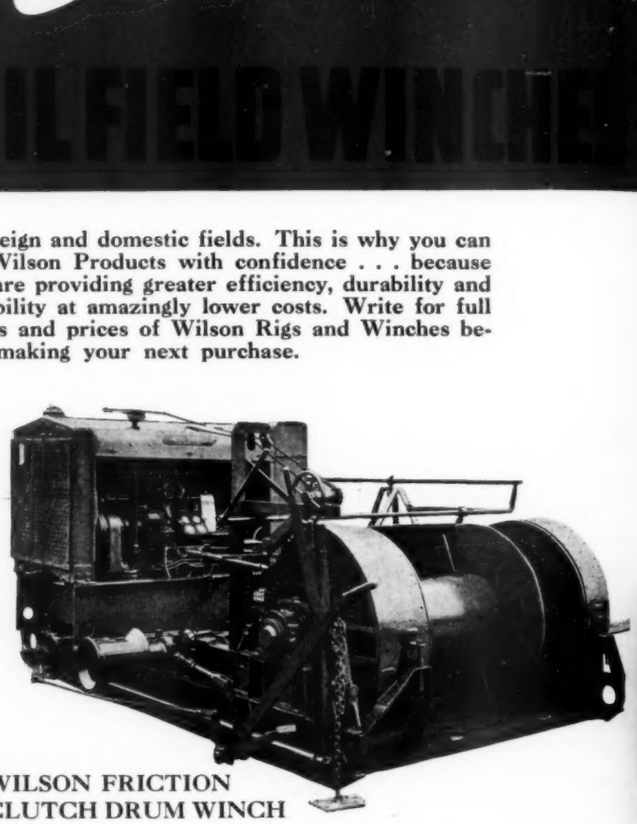
THE SENIOR MODEL, as have all Wilson Winches, has a free rolling drum with no chain mis-alignment; full hardened double step replaceable jaw clutch of nickel chromium steel, bevel undercut teeth; heavy nickel alloy cast-iron brake rings with fan type ribs securely riveted to drum ends; large capacity Timken bearings in drum, run in grease lubrication; new cam operated, fully equalized, self-energizing brakes. Brake surfaces are re-turned in lathe on centers after assembly of drum. The Senior Model Winch is recommended for handling up to 3,000 ft. of 2½" API Tubing. Other models are available for wells of 4,000, 5,000, 6,000 and 10,000 ft. depths.

LE MODELE SENIOR, de même que tous les treuils Wilson, a un tambour à roulement libre que ne connait pas les défauts d'alignement de chaine; embrayage entièrement trempé à mâchoires remplaçables à double degré en acier au nickel-chrome, dents dégagées coniques; segments de frein massifs en fonte d'alliage au nickel avec côtes en évantail rivées aux extrémités du tambour; paliers Timken de grande capacité dans le tambour, lubrification à la graisse; freins auto-serreurs de type nouveau complètement équilibrés et fonctionnant par came. Les surfaces de frein sont refaites au tour sur les centres après le montage du tambour. Le treuil de modèle Senior est recommandé pour manier jusqu'à 3.000 pieds de tubage de 2½ pouces API. D'autres modèles sont prévus pour puits de 4.000, 5.000, 6.000 et 10.000 pieds de profondeur.

EL MODELO SENIOR, como todos los demás montacargas Wilson, tiene un tambor de movimiento libre, independiente de la falta de alineación de cadena; embrague de acero al cromo y níquel, completamente endurecido, con mandíbulas reemplazables de doble grado; dientes de corte cónico; segmentos de freno macizos, fundidos de aleación de hierro al níquel, con costillas de tipo de abanico firmemente remachadas en los extremos del tambor; cojinetes Timken, de gran capacidad, en el tambor, provistos de grasa lubricante; frenos de nuevo tipo, accionados por levas, completamente compensados y de cierre automático. Las superficies de los frenos se repasan al torno, en los centros, después del montaje del tambor. El montacarga de modelo Senior se recomienda para manejar hasta 3.000 piés de tubería de 2½" A.P.I. Ofrecemos otros modelos para pozos de 4.000, 5.000, 6.000 y 10.000 piés de profundidad.

WILSON SENIOR MODEL MOTOR WINCH





WILSON FRICTION CLUTCH DRUM WINCH

THE WILSON FRICTION CLUTCH DRUM WINCH is equipped with a new, highly developed *Internal Expanding Triple Shoe Wilson Type Clutch* with shoes expanding on both ends. The clutch surface is a separate steel ring with air cooling space between the clutch ring and brake lining; angular type fan blades and open construction assure a well-cooled clutch and brake. Friction Clutch Drive to one end of drum only, or Friction Clutch Drive in one end and a Jaw Clutch Drive in the opposite end; or a Friction Clutch Drive in both ends can be furnished if desired. This clutch is available on the Super, Mogul and Giant Model Wilson Winches.

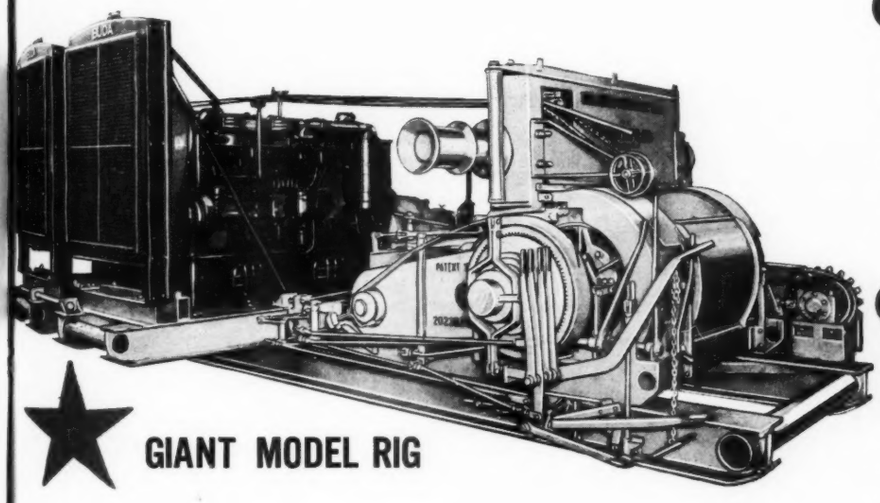
LE TREUIL WILSON A TAMBOUR A EMBRAYAGE A FRICTION est équipé avec un nouvel embrayage très perfectionné *de type Wilson à triple sabot et expansion interne,* avec sabots se détendant aux deux extrémités. La surface d'embrayage est une bague d'acier séparée avec un espace à refroidissement d'air entre la bague d'embrayage et la garniture de frein; des ailettes d'évantail du type angulaire et une construction ouverte assurent un embrayage et un frein bien refroidis. Commande d'embrayage à friction à un bout du tambour seulement, ou commande d'embrayage à friction à un bout et commande d'embrayage à mâchoires à l'autre bout; ou une commande à embrayage à friction aux deux extrémités peut être fournie au choix. Cet embrayage est offert sur les treuils Wilson de modèles Super, Mogul et Giant.

EL MONTACARGA WILSON CON TAMBOR DE EMBRAGUE DE FRICCION está provisto de un nuevo embrague muy perfeccionado de *tipo Wilson de triple zapata y extensión interior,* con las zapatas extendiéndose en ambos extremos. La superficie del embrague es un anillo de acero separado, con espacio para enfriamiento por aire entre el anillo del embrague y el forro de freno; aletas de ventilador de tipo angular, las cuales, en combinación con una construcción abierta, aseguran un embrague y un freno muy bien enfriados. Propulsión por embrague de fricción a un extremo del tambor solamente; o propulsión por embrague de fricción en un extremo con propulsión por embrague de mandíbula en el extremo opuesto; o bien, propulsión por embrague de fricción en ambos extremos, al gusto del interesado. Este tipo de embrague se instala en los montacargas Wilson de los modelos Super, Mogul y Giant.

★GIANT This rig has a rated capacity of 6,000 ft. and is designed to accommodate engines up to 250 H.P. each. It can be furnished with gas, gasoline or Diesel power units. 42″ diameter drum flanges, 10″ wide, dual, full wrap brakes. Drum is equipped with special water circulating rolled steel brake rings. Drum shaft is 6″ chrome nickel heat treated steel and cathead shaft is made of 4″ chrome nickel, heat treated steel. Heavy duty twin disc clutch on both the draw works motor and drum drive. As on all Wilson Rigs, the Giant Model is equipped with the WILSON CHAIN DRIVE TRANSMISSION which transmits 35% MORE POWER TO THE POINT OF ACTION than conventional drives. This exclusive feature alone assures you maximum power . . . at less cost!

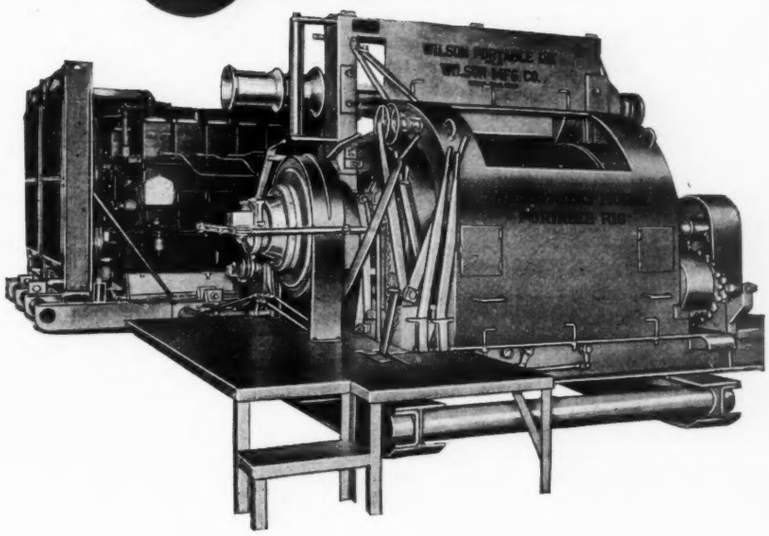
★GIANT Ce groupe a une capacité nominale de 6.000 pieds et est prévu pour convenir à des moteurs allant jusqu'à 250 H.P. chaque. Il peut être fourni avec moteurs à gaz, à essence ou Diesel. Brides de tambour de 42 pouces de diamètre, freins à entraînement total, jumelés, de 10 pouces de large. Le tambour est muni de segments de frein spéciaux en acier laminé à circulation d'eau. Le corps de tambour est en acier au chrome-nickel traité thermiquement de 6 pouces et l'arbre de tête porte-lames est en acier au chrome-nickel et traité thermiquement de 4 pouces. Embrayage à double disque de service dur tant sur le moteur de groupe de traction que sur commande de tambour. Comme sur tous les groupes Wilson, le modèle Giant est doté de la TRANSMISSION A CHAINE WILSON qui transmet 35% DE FORCE MOTRICE EN PLUS AU POINT D'APPLICATION que les commandes courantes. Cet avantage exclusif à lui seul vous assure un rendement maximum . . . à meilleur marché.

★GIANT Este aparejo tiene una capacidad nominal de 6.000 piés y está preparado para admitir motores hasta de 250 caballos de fuerza cada uno. Puede suministrarse con motores de gas, gasolina o de tipo diésel. El tambor tiene bridas de 42″ de diámetro, y los frenos, de 10″ de anchura, de tipo gemelo, son de cierre completo. El tambor está provisto de anillos de freno especiales de acero laminado para la circulación del agua. El árbol del tambor es de 6″ de aleación de acero al cromo y níquel tratada termicamente y el árbol del carretel o torno automático es de 4″ de aleación de acero al cromo y níquel tratada térmicamente. Hay un embrague de disco gemelo de trabajo pesado en el motor de la máquina de tracción y en la propulsión del tambor. Como en todos los aparejos Wilson, el modelo Giant está equipado con la TRANSMISION POR CADENA WILSON, la cual transmite 35% MAS FUERZA MOTRIZ AL PUNTO APLICACION que las transmisiones corrientes u ordinarias. Este solo rasgo exclusivo asegura un rendimiento máximo de fuerza . . . a costo mucho más económico.



★ GIANT MODEL RIG

● ATLAS MODEL RIG



●ATLAS This rig has rated capacity of 8,000 ft. It is designed to accommodate engines up to 250 H.P. each. It can be furnished with gas, gasoline or Diesel power units. 46″ Diameter drum flange and 10″ wide, dual, full wrap brakes. Drum equipped with special rolled steel water circulating brake rings. Equipped with 7″ chrome nickel, heat treated steel drum shaft and with 5″ chrome nickel, heat treated steel cathead shaft. Drum shaft extension for Hydromatic Brake installation is standard equipment.

●ATLAS Ce groupe a une capacité nominale de 8.000 pieds. Il est prévu pour convenior à des moteurs allant jusqu'à 250 H.P. chaque. Il peut être fourni avec moteurs à gaz, à essence ou Diesel. Bride de tambour de 46 pouces de diamètre, et freins à entraînement total, jumelés, de 10 pouces de large. Tambour muni de segments de frein spéciaux à circulation d'eau et en acier laminé. Equipé avec un corps de tambour en acier au nickel-chrome, traité thermiquement de 7 pouces et un arbre de tête porte-lames en acier au chrome-nickel et traité thermiquement de 5 pouces. Rallonge de corps de tambour pour installation de frein hydromatique prévue sur équipement standard.

●ATLAS Esta aparajeo tiene una capacidad nominal de 8.000 piés. Está preparado para admitir motores hasta de 250 caballos de fuerza cada uno. Puede suministrarse con motores de gas, gasolina o de tipo diésel. El tambor tiene bridas de 46″ de diámetro, y los frenos, de 10″ de ancgura, de tipo gemelo, son de cierre completo. El tambor está provisto de anillos de freno especiales de acero laminado para la circulación del agua. Lleva árbol de tambor de 7″ de aleación de acero al cromo y níquel tratada al calor y árbol de carretel o torno automático de 5″ de aleación de acero al cromo y níquel tratada también termicamente. El el equipo corriente se incluye extensión de árbol de tambor para la instalación de freno hidromático.

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structure where edge-water contacts the oil body. The well may not be located at the zone of contact between water and oil, but the disposal water is delivered into the water sand and not into the oil body. As this water accumulates it tends to force the oil above it toward the well and in this way may aid ultimate recovery. Some disposal wells are drilled for that particular purpose, but many such wells are old holes drilled into water accidentally and then abandoned. Regardless of how the well has been selected, it is necessary that the water returned to it be treated to prevent clogging of the pore space in the sand.

In water-flooding for secondary recovery of oil from old fields water-treating plants are being used and the treatment in this instance is for practically the same purpose as for water disposal. It is necessary to remove suspended or dissolved elements from the water so they cannot react with formation water or take up from the formation other elements that would be redeposited later and clog the sand pores. Properly to handle waters for either purpose requires strict chemical supervision and a thorough knowledge of all the elements entering into the water-disposal or flooding system.

DESALTING

Since the acidizing of limestone wells has become such common practice a new problem has confronted the production man. The treatment of emulsified crude oil is not a new problem, but with the advent of acidizing wells the emulsified crudes have been made harder to treat. The presence of large quantities of salts in the oils from this treatment is one phase of this general problem.

The use of hydrochloric acid has caused the formation of sodium, magnesium and calcium chlorides by interaction with the limestone. These are the salts referred to, and they readily dissolve in the water normally present in the formation from which the oil is produced. When the waters are carrying these salts the emulsion of oil and water is harder to treat. The crystalline salts which also have been found in the oil are prevented from settling out by protective films of asphalt, resins or petrolatum. In some instances unspent hydrochloric acid has been found in the oil. The salts present in the crude oil may vary in volume from a few pounds to over 750 pounds per 1,000 bbls. of oil.

These emulsions have been transported through pipe lines and have reached refinery stills, and

mais ce sont en général d'anciens puits qui ont abouti à une nappe d'eau par accident et avaient été abandonnés. Quel que soit le mode de sélection des puits, il est nécessaire que l'eau rendue au gisement soit traitée pour prévenir le colmatage des pores du sable.

Dans le cas de noyage à l'eau d'anciens chantiers pour extraction secondaire de pétrole on utilise des installations de traitement d'eau dans un but sensiblement le même que dans le cas de pur rejet des eaux. Il faut aussi en éliminer les éléments en suspension ou en solution afin qu'ils ne puissent pas réagir sur l'eau de gisement ou prendre au gisement d'autres élélments qui se redéposeraient plus tard et boucheraient les pores du sable. Dans un cas comme dans l'autre l'utilisation des eaux demande un contrôle chimique rigoureux et une connaissance approfondie de tous les éléments qui interviennent dans le système de rejet des eaux ou dans celui du noyage.

EXTRACTION DES SELS

Etant donné que le traitement aux acides des puits calcaires est devenu courant, le producteur s'est trouvé en présence d'un problème nouveau. Le traitement du pétrole brut émulsifié n'est pas un nouveau problème, mais avec l'ère des puits traités aux acides le traitement des pétroles bruts émulsifiés est devenu plus difficile. La présence de fortes quantités de sels dans les pétroles par suite de ce traitement est une phase de ce problème général.

L'emploi d'acide chlorhydrique a provoqué la formation de chlorures de sodium, de magnésium et de calcium par interaction avec la chaux. Ce sont là les sels en question, et ils se dissolvent facilement dans l'eau normalement présente dans la formation d'où on extrait le pétrole. Mais quand les eaux contiennent ces sels, l'émulsion de pétrole et d'eau est plus difficile à traiter. Les sels cristallins qu'on trouve aussi dans le pétrole ne peuvent plus se déposer à cause de pellicules protectrices d'asphalte, de résines ou de pétrolatum. Dans certains cas on a trouvé dans le pétrole de l'acide chlohydrique non combiné. Les sels présents dans le pétrole brut peuvent varier depuis quelques livres jusqu'à plus de 750 lbs. par 1.000 barils de pétrole.

Ces émulsions ont été transportées dans les pipe-lines et one été ainsi amenées aux alambics des raffineries, d'où il est résulté des dommages sérieux par corrosion et érosion. Pour éliminer ces ennuis il devient de plus en plus courant de traiter le pétrole brut au puits, sans compter que le sel et l'eau s'extraient beaucoup plus facilement quand les pétroles sont frais.

Une des méthodes reconnues de traitement de ces émulsions au puits est le procédé électrique d'extraction des sels. Elle permet le retour continu du pétrole dessalé dans le cycle sans perte appréciable de chaleur et assure un haut pourcentage d'extraction de sels. Selon le procédé de dessalage électrique on mélange au pétrole de l'eau à une température d'environ 140 à 190 degrés F. dans des conditions réglées et on introduit aussitôt le mépasa por las capas inferiores de cascajo y piedra triturada, escapándose por el fondo del tanque. Las substancias sólidas suspendidas en el agua quedan así separadas del líquido y éste, por su parte, queda listo para vaciarse en el pozo de entrada o admisión.

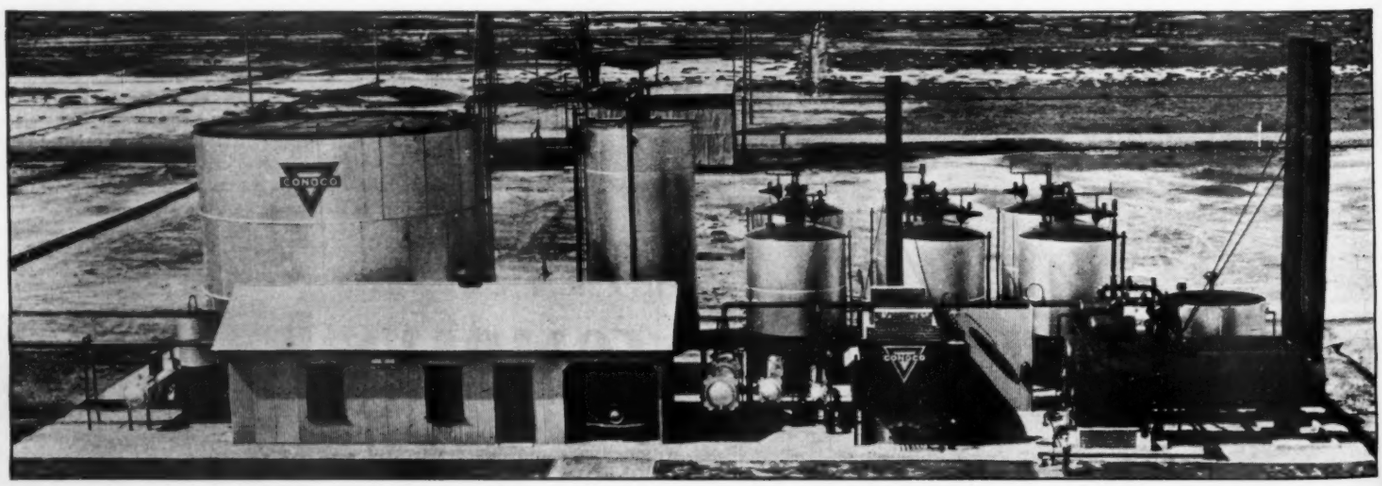
Los pozos de admisión, elegidos para recibir el agua por disponerse, están generalmente a un nivel de la estructura, en que el agua de borde está en contacto con el petróleo. Puede ser que el pozo no esté en esta zona de contacto entre el agua y el petróleo, en cuyo caso, el agua residual es entragada a la arena acuosa y no al mismo depósito de petróleo. A media que esta agua se acumula, tiende a empujar el petróleo que hay arriba, en la dirección del pozo. De este modo se puede facilitar mucho la extracción del petróleo remanente en la formación. A veces se perforan pozos especiales, para admitir esta agua, pero, por lo general, los empleados para este fin son aquellos pozos antiguos anegados accidentalmente durante la perforación y abandonados por infructíferos. Sea cual fuere el método de elegir los pozos para este fin, lo importante es que el agua por disponerse sea primeramente tratada, para que no tape la porosidad de la arena.

En el caso del procedimiento de anegación, aplicado a viejos campos petroliferos, se utilizan instalaciones de tratamiento casi idénticas a la que describimos aquí en conexión con la utilización y disposición del agua salada. Es necesario eliminar del agua todas las substancias en suspensión o disueltas, para que no se produzcan reacciones con el agua de la misma formación o yacimiento y para que no exista extracción de la formación de otros elementos que puedan depositarse de nuevo más tarde, tapando los poros de la arena. Para el manejo racional de las aguas, en ambos casos, se requiere un riguroso control químico y un conocimiento completo de todos los elementos que intervienen en la disposición y utilización del agua o en el procedimiento de anegación.

DESALAZON

A continuación del establecimiento de la acidificación de los pozos calcáreos, como práctica corriente, se ha presentado un nuevo problema a los productores de petróleo. El tratamiento del petróleo crudo emulsionado no es un problema nuevo, pero, con la introducción de la acificación de los pozos, se ha hecho más difícil el tratamiento del petróleo crudo emulsionado. La presencia de grandes cantidades de sales en el petróleo, a consecuencia de este tratamiento, es una importante fase del problema general.

El uso de ácido hidroclórico ha causa la formación de cloruros de sodio, de magnesio y de calcio, debido a la interacción de la piedra caliza. Estas son las sales particularmente en referencia. Se disuelven con facilidad en el agua normalmente presente en la formación productiva de petróleo. Cuando las aguas llevan esta sales en disolución, el tratamiento de la emulsión de petróleo y agua resulta más difícil. Las sales cristalinas, que también se presentan en el petróleo, no pueden se-



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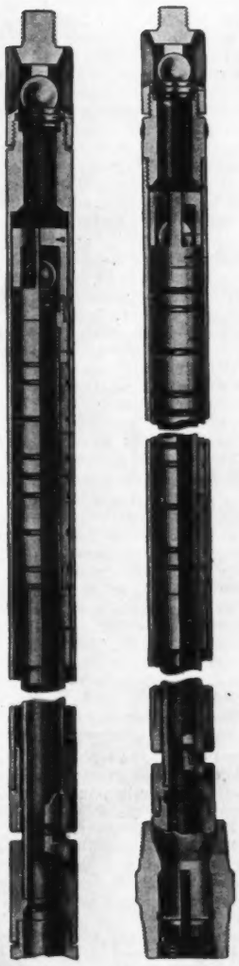

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"PETROL A" Groove Seal Pump

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The efficiency of the "Fluid Packed" principle has been demonstrated in pumping fluids of every degree of viscosity and gravity, from wells of all depths, in every oil producing country in the world. Their ability to handle large quantities of sand without freezing and with minimum abrasion has for years made them first choice wherever severe service conditions prevail.

"MARGINAL": This new little Fluid Packed Pump solves the problems of profitably producing stripper wells where troublesome sand conditions prevail. Embodies the same principles as the large Fluid Packed Pumps, with the same precision of manufacture and high quality of materials—at a new low price.

"POSITIVE PULL" means *postive pulling action.* Recommended wherever the insert feature is desired.

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much damage from corrosion and erosion has resulted. To eliminate this trouble it is becoming a common practice to treat the crude oil at the well, because when the oils are fresh the salt and water are removed more easily.

One of the approved methods of treating these emulsions at the well is the electric desalting process. This permits continuous return of the desalted oil to the system without appreciable loss of heat and it effects a high percentage of salt extraction. In the electrical desalting process water of approximately 140 to 190° F. temperature is mixed with the oil under controlled conditions and the resulting mixture is immediately introduced into an electric treater in which it is subjected to a high potential electric field.

The electric treater may be similar to those used in the electrical system of dehydrating crude oil emulsions. This system consists in subjecting a water-in-oil emulsion to the influence of a high-voltage alternating-current electric field, which serves to coalesce the water particles until they become large enough to settle out of the oil. This high-potential electric field acts much the same way upon the salt particles, and it has been found that when the water separates from the oil it contains most of the salt, often 90 to 95 per cent. Just how this is accomplished has not been explained, but tests show the results obtained are highly satisfactory.

The desalted oil leaves the top of the treater while the water containing the extracted salts is continuously withdrawn from the lower portion. Fresh water from available water sources is usually employed in the electric process of desalting oil. Exhaust steam may be used to bring the water up to the desired temperature. The proportion of water used varies with different crude oils. Satisfactory results have been achieved using as low as 5 per cent by volume of treating water, while with other oils the process may use as high as 50 per cent by volume of water.

Various methods may be employed to introduce the water into the emulsified oil, but the best results have been obtained by pumping the required quantity into the oil stream and then passing the mixture through a properly controlled mixing-valve. Such a valve may have a movable member forced toward a seat by the action of a weighted arm. The position of the weight on the arm may be controlled to vary the resilient force. The pressure of the oil and water entering the valve will force the valve member upward against this resilient force and the oil and water passing between the valve member and the seat will become mixed. By properly controlling the position of the weight, the materials will become mixed in such a manner as to facilitate subsequent electrical treatment. The pressure drop across the valve varies from 5 to 60 pounds per square inch.

RETROGRADE CONDENSATION

The old idea that crude oil existed underground only as fluid such as is seen in the stocktanks on the lease has given way in recent years to other theories. It is known that hydrocarbons under high pressures and temperatures will exist in other than the fluid state. As many of the oil fields now being developed and produced are of the high-pressure type, it follows that hydrocarbons existing there may be produced in three forms, as crude oil, distillates and natural gas from which gasoline may be extracted.

It is usual to assume that hydrocarbons in an underground reservoir are stratified with the gas in the upper part of the structure, the crude oil lower and beneath the gas and the water around

lange obtenu dans up appareil électrique où il est soumis à un champ électrique de haut potentiel.

L'appareil de traitement électrique peut être similaire à ceux qu'on emploie pour déshydrater par l'électricité les émulsions de pétrole brut. Le principe de ces derniers consiste à soumettre une émulsion d'eau dans du pétrole à l'influence d'un champ électrique de courant alternatif de haut voltage, ce qui a pour effet de réunir les particules d'eau jusqu'à un point où elles deviennent assez grandes pour se séparer du pétrole. Ce champ électrique de haut potentiel agit d'une manière très semblable sur les particules de sels, et on a constaté que lorsque l'eau se sépare du pétrole elle retient presque tout le sel, souvent de 90 à 95 pour cent. On n'a pas pu encore bien expliquer ce qui se passe ici, mais les essais ont donné des résultats des plus satisfaisants.

Le pétrole dessalé s'en va par le haut de l'appareil de traitement, alors que l'eau chargée des sels extraits est sans cesse soutirée par le bas. On emploie en général de l'eau douce prise aux fontaines dont on dispose dans le procédé électrique de dessalage des pétroles. On peut utiliser de la vapeur de décharge pour amener l'eau à la température désirée. La quantité d'eau employée varie selon les pétroles bruts dont il s'agit. On a parfois obtenu de bons résultats en n'employant que 5 pour cent en volume d'eau de traitement, alors que pour d'autres pétroles le procédé peut demander jusqu'à 50 pour cent en volume d'eau douce.

On a le choix de plusieurs méthodes pour introduire l'eau dans le pétrole émulsifié, mais on a obtenu les meilleurs résultats en pompant la quantité nécessaire dans le courant de pétrole, puis en faisant passer le mélange à travers une vanne de mélange à réglage approprié. Une telle vanne peut avoir un élément mobile pressé contre un siège par le mécanisme d'un bras lesté. La position du contrepoids sur ce bras peut être réglé pour varier la force élastique. La pression du pétrole et de l'eau à leur entrée dans la vanne poussera l'élément mobile de la vanne vers le haut en vainquant cette force résiliente et le pétrole et l'eau se mélangeront en passant entre l'élément mobile et le siège. Par un contrôle juste de la position du poids ce mélange se fera d'une manière devant en faciliter le traitement électrique ultérieur. La chute de pression en travers de la vanne varie de 5 à 60 lbs. par pouce carré.

CONDENSATION RETROGRADE

L'ancienne idée que le pétrole brut n'existait dans le sous-sol que sous la forme liquide observée dans les réservoirs de magasinage sur les chantiers a récemment cédé le pas à d'autres théories. Chacun sait que les carbures d'hydrogène sous pressions et températures élevées peuvent exister sous d'autres états que celui de fluide. Or comme de nombreux champs de pétrole actuellement mis en oeuvre sont du type sous hautes pressions, il s'ensuit que les carbures d'hydrogène qui s'y présentent peuvent y exister sous 3 formes, à savoir du pétrole brut, des distillés et du gaz naturel dont on peut extraire l'essence.

Il est d'usage de supposer que les carbures d'hydrogène dans une poche souterraine sont en couches avec le gaz à la partie supérieure du gisement, le pétrole brut étant en bas et en-dessous du gaz et l'eau le long du bord du gisement. Bien que cette vue générale puisse être juste dans des conditions normales, il est fort possible que sous de fortes pressions la plupart des carbures d'hydrogène du gisement soient à l'état gazeux.

Avant que le foret n'ait pénétré dans ces poches réservoirs, il y existe un état d'équilibre entre les carbures d'hydrogène et les eaux. Mais dés que cet état d'équilibre a été troublé le gaz et le pétrole se mettent à se déplacer vers le point de basse pression créé par le percement des rocs de la poche sous le foret, et ils s'échappent par le puits jusqu'à la surface. C'est ce qu'on appelle le jaillissement naturel, et il dure tant que l'énergie emmagasinée dans la poche est suffisante pour amener le courant de gaz et de pétrole à la surface. Après cela il faut avoir recours à d'autres moyens mécaniques pour pomper ou monter le pétrole.

De tout temps les exploitants ont cherché à faire produire les puits de pétrole jusqu'à épuisement par le jaillissement naturel. Dans les anciens chantiers on laissait les puits produire avec les vannes au sommet du revêtement grandes ouvertes et le courant de pétrole s'écouler le plus vite possible jusque dans les réservoirs de magasinage. Dans de telles conditions d'extraction le gaz qui accompagnait le pétrole était très en excès de celui stricte-

pararse o precipitarse, debido a las capas protectivas de asfalto, resinas y petrolato. En algunos casos, se ha hallado ácido hidroclórico en el mismo petróleo. Las sales presentes en el petróleo crudo varian en cantidad, desde unas pocas libras hasta más de 750 libras por 1000 barriles de petróleo.

Estas emulsiones, transportadas por el sistema de tubería, han llegado a los serpentines de las refinerías, produciendo aquí serios daños por corrosión y erosión. Para evitar esta dificultad, se sigue ahora la práctica de tratar el petróleo crudo en el mismo pozo, pues cuando el petróleo está fresco, la depuración de su sal y agua resulta más fácil.

Uno de los mejores métodos de tratar estas emulsiones en el pozo es el procedimiento de desalazón eléctrica. Este método permite el contínuo regreso del petróleo desalado al sistema, sin apreciable pérdida de calor, produciendo un alto porcentaje de extracción salina. En el procedimiento de desalazón eléctrica, el agua a una temperatura de 140 a 190 grados F., se mezcla con el petróleo, bajo condiciones reguladas, y la mezcla resultante es inmediatamente introducida en el aparato de tratamiento eléctrico, en el cual queda sometida a un campo eléctrico de gran potencial.

El aparato de tratamiento eléctrico es similar al que se emplea en el sistema eléctrico de deshidratar emulsiones de petróleo crudo. El método consiste en someter la emulsión de agua y aceite a la influencia de un campo eléctrico de corriente alterna de alto voltaje, que sirve para unir las partículas de agua. Al unirse, éstas se ponen bastante grandes para separarse del petróleo. Este campo eléctrico de gran potencial actúa de manera muy similar sobre las partículas de sal, y se ha visto que cuando el agua se separa del petróleo, contiene casi toda la sal, a menudo de 90 a 95% del total. De cómo se realiza ésto, no hay todavía una explicación completa, pero los ensayos muestran que los resultados obtiendos son siempre muy satisfactorios.

El petróleo desalado sale por arriba del aparato, mientras el agua con las sales extraídas, se escapa en chorro contínuo por la parte inferior. Generalmente se emplea agua fresca, proveniente de algún abastecimiento vecinal, en conexión con este procedimiento eléctrico. Para calentar el agua a conveniente temperatura, se aprovecha el vapor de escape. La cantidad de ague empleada varía de acuerdo con las diferentes clases de petróleo crudo por tratarse. Se han obtenido resultados satisfactorios empleando una pequeña cantidad de agua de tratamiento, como 5% por volumen; pero, hay, por otra parte, ciertos petróleos que requieren hasta 50% por volumen.

Varios métodos pueden seguirse para la inyección del agua en el petróleo emulsionado, pero los mejores resultados se han obtenido aplicando la requerida cantidad al chorro de petróleo y pasando luego la mezcla por una válvula mezcladora correctamente regulada. Semejante válvula puede tener un miembro móvil, empujado sobre su asiento por las acción de un brazo con peso. La posición del peso en el brazo puede cambiarse, a fin de regular la tensión elástica ejercida sobre el miembro móvil de la válvula. La fuerza del petróleo y agua, al entrar en la válvula, empuja el miembro móvil, levantándolo contra esta tensión elástica. El petróleo y el agua se mezclan así muy bien al pasar juntos por el espacio entre el miembro móvil de la válvula y el asiento del mismo. Regulando bien la posición del paso, estos líquidos quedan mezclados de un modo que facilita mucho el tratamiento eléctrico que viene a continuación. La variación o caída de presión por las válvula pueda comprendida entre 5 y 60 libras por pulgada cuadrada.

CONDENSACION RETROGADA

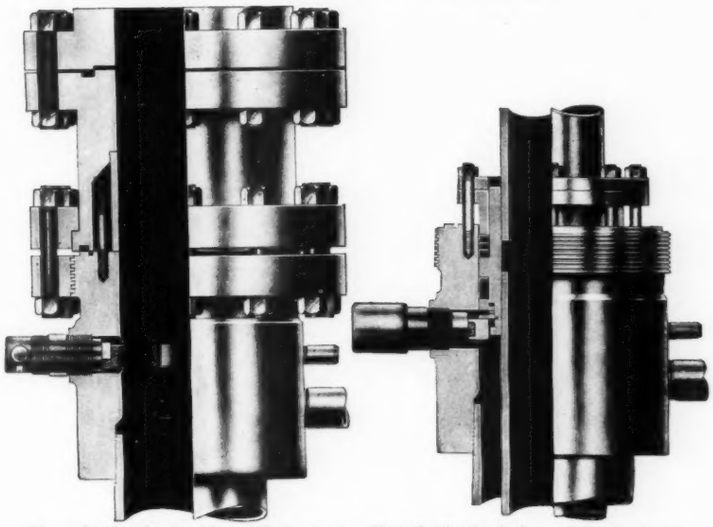
La antigua idea de que el petróleo crudo subterráneo se presentaba únicamente en forma líquida, tal como lo vemos en los tanques de depósito en la propiedad, ha cedido terreno estos últimos años, a otras teorías. Se sabe que los hidrocarburos bajo grandes presiones y temperaturas existen también en otros estados, además del líquido. Como muchos de los campos petroliferos, ahora en desarollo y producción, son del tipo de alta presión, esto quiere decir que los hidrocarburos existentes en ellos se presenten en tres formas: petróleo crudo, destilados y gas natural, de todos los cuales puede extraerse gasolina.

Por lo general, se asume que los hidrocarburos en un yacimiento subterráneo, estan estratificados, con el gas en la parte superior de la estructura,

The GREATEST ADVANCE IN CASING HEAD DESIGN IN A DECADE

The New GULFCO TRUE FULL-HOLE Retractable Seat CASING HEAD

6,000 lbs., 10,000 lbs. Test Pressures



View showing head while well is being drilled and also retracted position of dogs of Retractable Seat while casing is being run.

En este grabado mostramos la cabeza durante la perforación del pozo y también la posición retraida de los barriletes del asiento retractable durante la descensión del revestimiento.

Cliché montrant la tête pendant le forage du puits et aussi position de rappel des tocs du siège à rappel pendant la descente du revêtement.

View showing head after well has been completed. Half turn of lever (on outside of head) has advanced seat dogs to supporting position.

En este grabado mostramos la cabeza después de que se ha terminado el pozo. Una media vuelta a la palanca (en el exterior de la cabeza) ha avanzado los barriletes del asiento a la posición de soporte.

Cliché montrant la tête après que le puits est terminé. Un demi tour du levier (à l'extérieur de la tête) a amené les tocs de siège à la position de support.

FULL OPENING: Same I.D. as I.D. of casing used, permitting any tool that can be used in the casing to be run through the head without the necessity of making any changes of equipment on the head.

In a test in the presence of engineers of major oil companies, seat withstood a load of 630,000 pounds.

Permits the setting of casing at any point in the well as the suspension can be raised or lowered through head as desired.

Not necessary to use blowout preventer of larger size, or to rebore to larger size, to take care of suspension.

Easy to stretch casing after cementing.

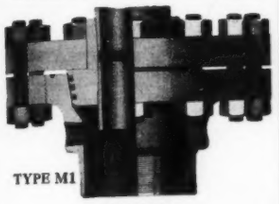
SAVES 10 TO 15 HOURS TIME: Crew does not have to remove blowout preventer before casing can be set. The Gulfco head is on the well at all times, ready for instant use, *a feature that may in an emergency, save the entire investment in the well.*

ABERTURA TOTAL: El mismo diámetro interior que el del revestimiento empleado, lo que permite el paso por la cabeza de cualquier herramienta que se pueda emplear en al revestimiento, sin necesidad de hacer cambio alguno en el equipo de la cabeza.
En un ensayo hecho en presencia de ingenieros de importantes compañías de petróleo, el asiento resistió una carga de 630.000 libras.
Permite la colocación del revestimiento en cualquier punto del pozo, pues la suspensión puede ser subida o bajada, a través de la cabeza, al grado que se desee.
No es necesario emplear un evitador de explosión de gran tamaño. Tampoco es necesario agrandar el diámetro interior, para efectuar la suspensión.
Resulta fácil tender el revestimiento después de la cementación.
AHORRA DE 10 A 15 HORAS DE TRABAJO: Los trabajadores no tienen que quitar el evitador de explosión, antes de poder colocar el revestimiento. La cabeza Gulfco está sobre el pozo en todo momento, lista la servicio inmediato, lo cual *es un rasgo que en un caso imprevisto puede salvar toda la inversión en el pozo.*

OUVERTURE TOTALE: Même D.I. que D.I. de revêtement employé, ce qui permet de faire passer à travers la tête tout outil qu'on peut employer dans le revêtement sans être obligé de faire aucun changement d'équipement sur la tête.
Dans une épreuve conduite en présence des ingénieurs de compagnies pétrolières d'élite, le siège a résisté à une charge de 630.000 lbs.
Permet la pose du revêtement en tout point du puits car la suspension peut être élevée ou descendue à travers la tête au degré désiré.
Il n'est pas nécessaire d'employer de pare-éclatement de forte taille, ni de réaléser en plus fort calibre, pour effectuer la suspension.
Il est facile de tendre le revêtement après la cimentation.
ECONOMIE DE TEMPS DE 10 à 15 HEURES: L'équipe n'a pas à sortir le pare-éclatement avant de pouvoir poser le revêtement. La tête Gulfco est sur le puits en tout temps, prête, à l'emploi instantané, *un dispositif qui peut en cas d'imprévu sauver toute l'installation du puits.*

The trend is to Gulfco Forged Steel for Safety

OTHER GULFCO CASING HEADS

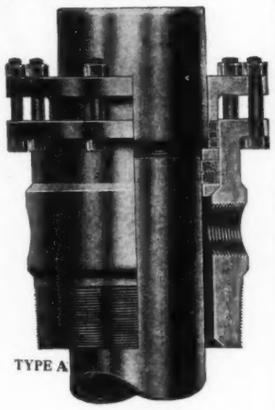


TYPE M1

GULFCO
Forged Steel Casing Heads
3000 lbs., 6000 lbs. test pressures. Open hole type head with flanged body to be used for drilling through, running casing and tubing. Blowout preventer is bolted down on the flanged body. Can be furnished with groove for steel ring, or hydraulic packing.

Cabezas de revestimiento de acero forjado
Presiones de ensayo de 3000 y 6000 libras.
Cabeza de tipo agujero abierto, con brida en el cuerpo, empleada en la perforación y la colocación de revestimiento y tubería. El evitador de explosión está asegurado por pernos al cuerpo embridado. Puede suministrarse con ranura para anillo de acero o empaquetadura hidráulica.

Têtes de revêtement en acier forgé
Pressions d'essai 3000 lbs., 6000 lbs.
Tête du type à trou ouvert avec corps bridé pour emploi en forage à travers, pose de revêtement et de tubage. Le pare-éclatement est boulonné sur le corps bridé. Peut être fourni avec gorge pour bague d'acier, ou garniture hydraulique.



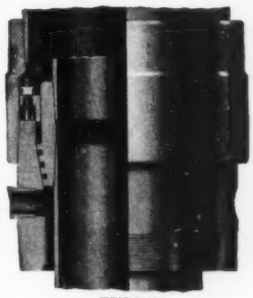
TYPE A

GULFCO
Forged Steel Repackable Casing Heads and Braden Heads
2000 lbs., 4000 lbs., 6000 lbs., test pressures. Male or female threads. High pressure asbestos packing. Lower packing acts as seal-off while changing the upper packing.

Cabezas de revestimiento y cabezas Braden de acero forjado, reempacables
Presiones de ensayo de 2000 lbs., 4000 lbs. y 6000 lbs. Rosca exterior o interior.
Empaquetadura de asbesto de alta presión. La empaquetadura de abajo actúa como un cierre hermético mientras se cambia la empaquetadura de arriba.

Têtes de revêtement et têtes Braden regarnissables en acier forgé
Pressions d'essai de 2000 lbs., 4000 lbs. et 6000 lbs. Filetage extérieur ou intérieur.
Garniture d'amiante de haute pression. La garniture d'en bas assure l'étanchéité pendant qu'on change la garniture d'en haut.

OTHER GULFCO CASING HEADS

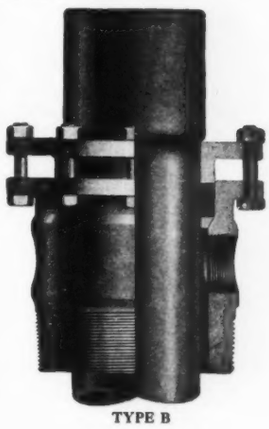


TYPE M

GULFCO
Forged Steel Casing Heads
3000 lbs., 6000 lbs. test pressures.
For both low and high pressure wells. Provided with adapter nipple for connecting blowout preventer.

GULFCO
Cabezas de revestimiento de acero forjado
Presiones de ensayo de 3000 y 6000 libras.
Para pozos de baja y de alta presión. Provistas de un dispositivo de adaptación para su conexión con el evitador de explosión.

GULFCO
Têtes de revêtement en acier forgé
Pressions d'essai 3000 lbs., 6000 lbs.
Tant pour puits de basses que de hautes pressions. Prévues avec raccord adapteur pour relier de pare-éclatement.



TYPE B

GULFCO
Louisiana Pattern Forged Steel Casing Heads
1500 to 3000 lbs., and 3500 to 6000 lbs. test pressures.
Flax or high pressure asbestos packing optional.

GULFCO
Cabezas de revestimiento de acero forjado, modelo Luisiana
Presiones de ensayo de 1500 a 3000 libras y de 3500 a 6000 libras.
Empaquetadura de lino o de asbesto de alta presión a elección.

GULFCO
Têtes de revêtement en acier forgé de modèle Louisiane
Pressions d'essai de 1500 à 3000 lbs., et de 3500 à 6000 lbs.
Garniture de lin ou d'amiante pour haute pression au choix.

GULF COAST MACHINE & SUPPLY CO.

18 years manufacturing high grade forged steel oil field equipment

BEAUMONT, TEXAS

General Office and Shop: 305-315 South Mariposa St., P. O. Box 1989—Telephone 326—Beaumont, Texas
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So long as the nation's drums traverse the highways, railways and seaways of the world—just so long will Tri-Sure 3-Point-Seal Closures continue to assume the major responsibility for their safe and sound delivery.

No greater assurance exists—against tampering, substitution, fire and waste—than Tri-Sure's drumguards. Neither mishap, mishandling nor malice aforethought can disturb their firm, fast, air-tight, liquid-tight sealing. In short, drums "signed, sealed and delivered" with Tri-Sure 3-Point-Seal Closures guarantee consigner and consignee alike—full protection, full confidence—and full contents!

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Tri-Sure
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will be paid by the AMERICAN FLANGE & MANUFACTURING CO., INC., to anyone in the U. S. A. or Canada causing arrest and conviction of persons unlawfully removing genuine Tri-Sure closures and seals, with intention of committing a felony. Suitable reward will be paid in other countries.
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the edge of the structure. While this general idea may be correct under normal conditions, under high pressures it is possible that most of the hydrocarbons in the reservoir are in a gaseous state.

Before the reservoirs are penetrated by the drill a state of equilibrium existed between hydrocarbons and waters. As soon as this state of equilibrium is disturbed the gas and oil start to move to the point of low pressure created by the puncturing of the reservoir rocks by the drill and they escape through the well to the surface. This is commonly known as natural flow, and it will continue as long as the energy stored in the reservoir is sufficient to deliver the stream of gas and oil to the surface. After that the oil must be pumped or lifted by some other mechanical means.

It long has been the desire of all operators to produce their wells to a state of depletion by natural flow. In the older fields the wells were permitted to produce with the valves at the casinghead wide open and the stream of oil flowing into stocktanks as rapidly as possible. The gas accompanying the oil under such flowing conditions was greatly in excess of that needed actually to lift the oil accompanying it to the surface, so there was a prodigious waste of formation energy and consequently a major portion of the originally recoverable oil was left in the reservoir. Some of this oil now is being lifted by secondary recovery methods, but much of it will never be brought to the surface by drilled wells and will be recovered only when the oil sand is removed and washed.

It is known that much of the oil left in the incorrectly produced reservoirs is clinging to the sand grain or is so thick as to be hard to flow through the fine pore spaces in the reservoir rock. It is also known that had this oil been retained in its original condition of viscosity as created by nature a much greater proportion of it would have been recovered.

The modern technician working with oil-field recovery problems is trying to correct the poor practice methods and is doing laboratory research to determine the true characteristics of hydrocarbons under various temperature and pressure

(Continued on Page 212)

ment nécessaire pour amener le pétrole à la surface de la formation, de sorte qu'il y avait là un gaspillage énorme d'énergie de pression et partant une forte portion du pétrole qu'on aurait pu à l'origine extraire était condamné à rester dans la poche. On arrive maintenant à extraire une partie de ce pétrole par des méthodes d'extraction secondaire, mais une bonne partie ne pourra jamais être amenée à la surface par des puits de forage et ne pourra être recueillie que par extraction et lavage des sables pétroliers.

On sait qu'une bonne partie du pétrole restant dans des poches ainsi mal vidées est soit fixé aux graines de sable soit si épais que l'écoulement en est difficile à travers les pores resserrés du roc de la poche. On sait aussi que si ce pétrole avait été maintenu dans son état original de viscosité tel que créé par la nature, une beaucoup plus forte portion en aurait été recueillie.

Le technicien moderne qui étudie les questions d'extraction rationnelle du pétrole vise à corriger les pratiques mauvaises et fait des recherches de laboratoire aux fins de préciser les vraies caractéristiques des carbures d'hydrogène dans diverses conditions de température et de pression. Il a ainsi précisé de nombreux points importants qu'il applique aux méthodes de prospection et de production.

Le premier objectif est de maintenir le pétrole brut dans le gisement aussi près que possible de sa viscosité d'origine. On ne peut y arriver qu'en maintenant dans le pétrole le gaz occlus que la Nature y a placé. La vitesse d'écoulement du pétrole jusqu'au puits et à sa sortie doit être contrôlée, et les rapports gaz-pétrole maintenus aussi bas que possible tout en libérant une énergie suffisante pour amener le pétrole à l'air libre.

Si l'extraction est bien conduite la Nature aidera car le pétrole qui s'échappe avec un minimum de gaz et contrôle judicieux de contre-pression est dans un état de fin brouillard. Il arrive à la surface complètement atomisé et finement divisé et n'est précipité à l'état liquide que lorsque la pression et la vitesse de l'écoulement faiblissent. Cette colonne de fin brouillard est plus légère qu'une colonne de pétrole brut et de gaz mélangés, et partant il y a besoin en fait de moins d'énergie pour amener un baril de ce genre de pétrole atomisé à la surface qu'il n'en faudrait pour extraire un baril de pétrole brut liquide ne contenant aucun gaz occlus.

Le deuxième objectif est de maintenir la pression de formation aussi près que possible de la pression d'origine. On peut y arriver en extrayant le gaz qui a servi à amener le pétrole à la surface, en le faisant passer à travers une installation d'essence naturelle où l'on recueille l'essence. Le gaz dépouillé de son essence est livré à des compres-

(Continué sur Page 212)

el petróleo crudo, en la parte inferior y debajo del gas, y el agua, alrededor del borde de la formación. Aunque esta idea general puede ser correcta, bajo condiciones normales, se puede, sin embargo, decir, que bajo altas presiones es posible que la mayor parte de los hidrocarburos en el yacimiento está en estado gaseoso.

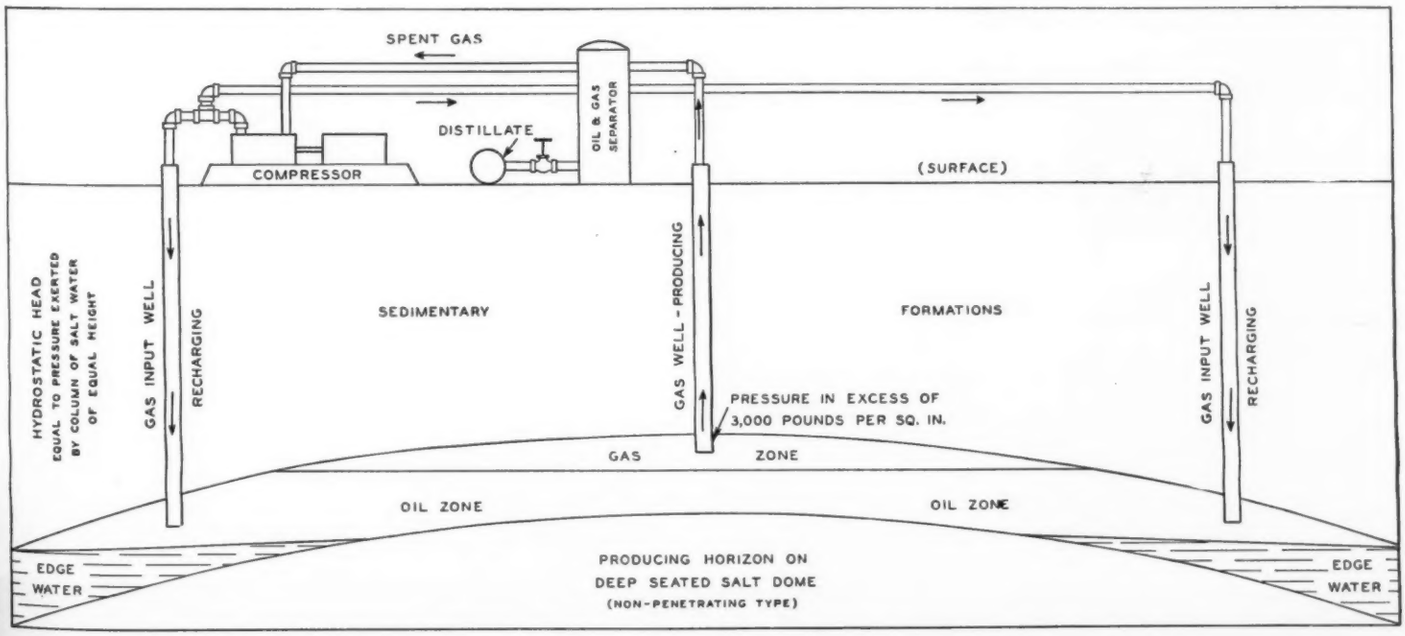
Antes de que los yacimientos sean penetrados por la sonda, existe un estrado de equilibrio entre los hidrocarburos y el agua. Tan pronto como este estado de equilibrio se perturba, el gas y el petróleo empiezan a moverse hacia el punto de baja presión, creado por la abertura de las rocas del yacimiento por la sonda, escapándose finalmente por el pozo a la superficie. Esto es lo que se llama comunmente corriente natural, y continúa mientras la energía almacenada en el yacimiento sea suficiente para lanzar el chorro de gas y petróleo a la superficie. A continuación de ésto, es necesario extraer el petróleo con bomba o con otro medio mecánico.

Desde hace tiempo, el deseo de los explotadores ha sido sus pozos produzcan por corriente natural hasta su agotamiento. En los campos más antuguos se permitía que los pozos produjieran con las válvulas en la cabeza del revestimiento completamente abiertas, pasando el chorro de petróleo a las tanques de depósito, con la mayor rapidez posible. El gas que accompañaba al petróleo bajo semejantes condiciones de corriente natural, era grandemente en exceso al que realmente se necesitaba para levantar el líquido a la superficie. Había, por lo tanto, un derriche enorme de energía de presión, y por consiguiente, se dejaba en el yacimiento una importante porción del petróleo originalmente recuperable. Parte de este petróleo se está extrayendo mediante métodos de extracción secundarios, pero una porción considerable de este petróleo nunca podrá salir a la superficie, a través de los pozos perforados y sólo podrá recogerse recurriendo a la extracción y lavado de las arenas petrolíferas.

Se sabe que mucho del petróleo retenido en los yacimiento incorrectamente explotados, está adherido a los granos de arena, a bien, es tan espeso que le es muy difícil pasar por la fina porosidad de la roca del yacimiento. Se sabe también que si este peróleo se hubiera retenido en su original condición de viscosidad, tal como lo creó la naturaleza, podría entonces extraerse en una proporción mucho mayor todavía.

El técnico moderno, que estudia los problemas de recuperación en los campos petrolíferos, está tratando de corregir los métodos y práctocas incorrectos. Está haciendo especiales investigaciones de laboratorio para determinar las verdaderas características de los hidrocarburos bajo di-

(Continué en Página 212)



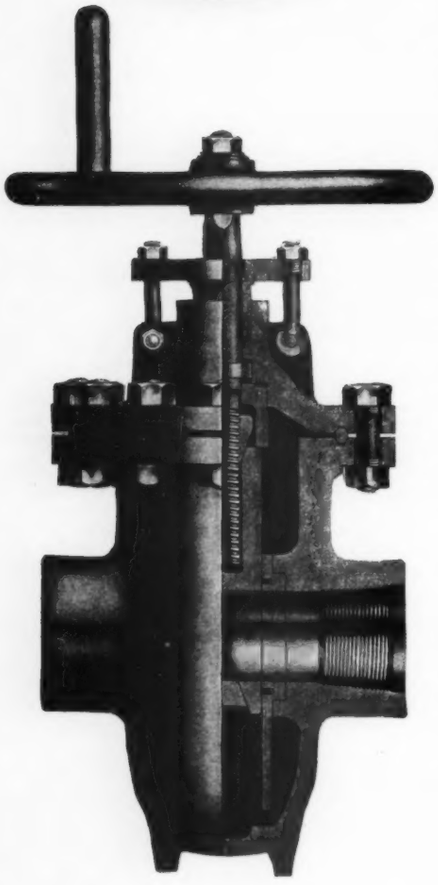
Schematic sketch of surface and underground equipment for recharging high-pressure producing formations for pressure maintenance

Croquis schematique de materiel de surface et de sous-sol pour le rechargement de gites profondement enfouis produisant sous haute pression afin d'y maintenir la pression

Presentacion esquematica del equipo superficial y subterraneo empleado para recargar profundas formaciones productivas de alta presion, que requieren la conservacion de una presion determinada

the Popularity of W-K-M

W-K-M GATE VALVE



Through-Conduit opening eliminates restriction of flow, and seat faces are not exposed to pressure. Any sediment carried down with gate is automatically flushed out when valve is opened. Smaller area exposed to pressure, confining flow to minimum space. Body serves as grease chamber, and all moving parts work in grease bath. Parallel gates expand uniformly, and double wedge construction assures positive seal-off on both sides in either open or closed position. Patented bronze wipe-and-seal rings clean gate and seats at each operation. Bronze seats, extra large, are renewable.

Une ouverture à conduit d'un bout à l'autre supprime la restriction de l'écoulement, et les faces de sièges ne sont pas exposées à la pression. Tout sédiment entraîné avec la vanne est rejeté automatiquement quand la soupage s'ouvre. Plus petite surface exposée à la pression, limitant le courant à un minimum d'espace. Corps sert de chambre à graisse, et toutes les pièces mobiles sont dans un bain de graisse. Les vannes parallèles s'écartent uniformément, et une construction à double coin assure une obturation positive des deux côtés tant en position ouverte que fermée. Des bagues brevetées en bronze type râcle-et-obture nettoient la vanne et les sièges à chaque opération. Sièges de bronze, extra-grands, renouvelables.

La abertura de conducto expedito suprime la restricción de la corriente y las caras de los asientos no quedan expuestas a la presión. Todo sedimento llevado por la bajada de la compuerta sale automáticamente cuando la válvula de abre. La menor superficie expuesta a la presión confina la corriente a un espacio mínimo. El cuerpo sirve de cámara de grasa y todas las piezas móviles funcionan en un baño de grasa. Las compuertas paralelas se extienden uniformemente y la construcción de doble cuña asegura un cierre positivo en ambos lados, tanto en la posición abierta como en la cerrada. Anillos de bronce patentados de tipo de restregadura y cierre, limpian las compuertas y los asientos en cada operación. Los asientos de bronce de gran tamaño, son renovables.

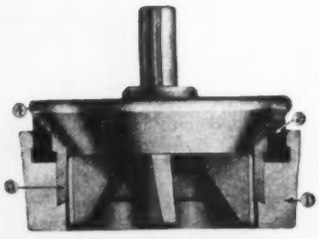
CASING CENTRALIZER

Holds casing and cementing shoe in exact center of hole, allowing cement to flow entirely and evenly around casing. Also effects a whirling action by the spiral blades, avoiding channeling of cement. Cleans the well bore, permitting thorough penetration and bonding of cement. Spiral design of blades contacts entire circumference of hole and cannot plow furrows or keyseats in the wall. Easily run in and pulled from hole.

Maintient le revêtement et le sabot de cimentation au centre exact du trou, ce qui permet au ciment de couler entièrement et également au tour du revêtement. Effectue aussi un tournoiement par les lames spirales, ce qui évite d'échancrer le ciment. Nettoie le trou du puits, permettant la pénétration et la prise du ciment. Le tracé spirale des lames prend contact avec la circonférence entière du trou et ne peut pas creuser des sillons ou des portées dans le mur. Facile à descendre ou à sortir du trou.

Mantiene el revestimiento y la zapata de cementación al centro exacto del agujero, lo que permite introducir el cemento de una manera uniforme alrededor del revestimiento. Efectúa también un movimiento giratorio, mediante las paletas espirales, lo que evita que el cemento se canalice. Limpia el agujero del pozo, lo que facilita mucho la penetración y colocación del cemento. La forma espiral de las paletas tiene contacto con la completa circunferencia del agujero y no puede ranurar o dañar de otra manera la pared. Puede introducirse en el agujero y scarse de él con suma facilidad.

TWIN-SEAT SLUSH PUMP VALVE



Doubles the life of slush pump mud ends, and cuts repair costs 30 to 40%. Bronze seat body fits into pump deck and stays there, eliminating frequent pulling of seats and resulting wear of fluid end. Wear is thrown on the replaceable rubber and steel insert seats.

Double la vie utile des extrémités à boue de pompe à limon, et réduit les frais de réparation de 30 à 40%. Le corps de siège en bronze s'adapte dans le pont de pompe et y reste, supprimant le tiraillement fréquent des sièges et l'usure résultante du bout à liquide. L'usure est reportée sur le caoutchouc remplaçable et les sièges rapportés en acier.

Aumenta al doble la duración de los extremos de la bomba de lodo o barro y reduce los gastos de reparación de 30 a 40%. El cuerpo del asiento de bronce se adapta al puente de la bomba y colocado aquí evita el frecuente desprendimiento de los asientos y el resultante desgaste del extremo líquido. El desgaste recae sobre la pieza de caucho reemplazable y los asientos de acero insertados.

W-K-M Company, Inc.

OIL FIELD, PIPE-LINE & INDUSTRIAL EQUIPMENT

HOUSTON, Texas, U. S. A.

Export Office: 74 Trinity Place, New York

Cable Address: "WILKOMAC"

PRODUCTS

Knows no National Bounds

ROTARY FRICTION SLIPS

Provides more gripping area, greater holding capacity, and smooth action. Takes hold and releases instantly, and will not slip, cut or bottleneck the pipe. Extremely light and easy to handle. Highly flexible. Segments easily replaced on derrick floor at small cost, making slips same as new. Made of highest quality one-piece, drop-forged and heat-treated segments.

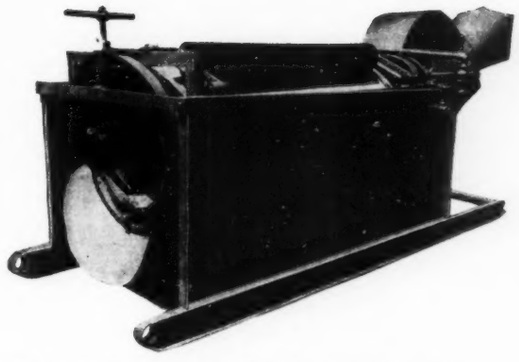
Fournit une plus grande surface d'adhérence, une plus grande capacité de contenance et une action douce. Saisit et relâche instantanément, et ne lâchera pas, ni ne coupera ou coincera le tuyau. Légèreté extrême et facilité d'emploi. Très souple. Segments faciles à remplacer sur le plancher de tour de sondage à peu de frais, rendant les fourreaux comme neufs. En segments de haute qualité, en une seule pièce, forgés au marteau-pilon et traités thermiquement.

Provee una mayor superficie de adherencia, una mayor capacidad de sujeción y una acción suave. Sujeta y suelta instantaneamente, sin resbalarse y sin cortar o dañar el tubo. Extraordinariamente liviano y fácil de manejar. Bien flexible. Los segmentos pueden reemplazarse fácilmente en el piso de la torre, a poco costo, dejando los sujetadores lo mismo que nuevos. Se hace de segmentos de superior calidad, de una sola pieza, forjados a martinete y tratados termicamente.

MUD SCREEN

The proven method of removing cuttings from mud without the use of steam turbines or electric motors. Requires no motive power other than the natural flow of mud returns from the well. Screening done by rotation of screening drum, without high speeds or vibration. Two separate screening surfaces used, one removing coarse shale and the other removing finer shale particles and damaging sand.

La méthode démontrée d'extraire les débris de la boue sans l'emploi de turbines à vapeur ou de moteurs électriques. Ne demande pas d'autre force motrice que le courant naturel de boues de retour venant du puits. Tamisage par rotation de tambour de tamisage, sans grandes vitesses ou vibration. Emploi de deux surfaces de tamisage séparées, dont une enlevant les schistes grossiers et l'autre les fines particules de schistes et sable endommageant.



El método demostrado de extraer los desechos del lodo, sin el empleo de turbinas de vapor o de motores eléctricos. No requiere otra fuerza motríz que la corriente natural del lodo de regreso del pozo. La cribadura se hace por la rotación del tambor del aparato, sin grandes velocidades o vibración. Se emplean dos superficies de cribadura separadas, la una para quitar los esquistos gruesos y la otra para quitar las partículas más finas y la arena dañina.

PIPE CLEANING MACHINE

Cleans old or new lines, 2 or more miles daily, traveling the made-up line under its own power. Hundreds of toothed cutter wheels remove all scale, rust, dirt, etc., and a series of steel wire brushes leave a smooth, bright surface. Special scraper knives remove felt or wrapping. Built in a range of sizes to clean 2" to 24" pipe. Readily convertible from one size to another, or from traveling to stationary machine.

Nettoie les conduites anciennes ou neuves, à raison de 20 milles ou plus par jour, parcourant la conduite posée par sa propre énergie. Des centaines de roues coupantes à dents enlèvent toute incrustation, rouille, crasse, etc. et une série de brosses métalliques laissent une surface lisse et brillante. Des couteaux racleurs spéciaux enlèvent le feutre ou revêtement. Choix de tailles pour calibres de tuyau de 2 à 24 pouces. Facile à convertir d'une taille à l'autre, ou de machine mobile à fixe.

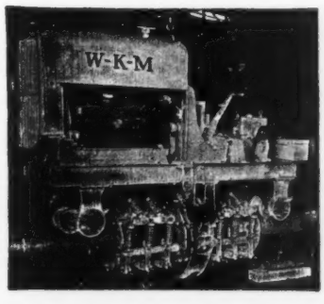
Limpia tuberías nuevas y viejas, a razón de 2 millas o más al día, recorriendo la línea por limpiarse, bajo su propai energía. Centenares de ruedas dentadas y afiladas quitan toda la costra, moho, mugre, etc., y una serie de escobillas de alambre de acero dejan la superficie bien limpia y brillante. Cuchillas raspadoras especiales se encargan de quitar el fieltro y otros forros exteriores. Se ofrecen en varios tamaños, para limpiar tuberías de 2 a 24 pulgadas de diámetro. Fácilmente se puede convertir de un tamaño a otro, lo mismo que de máquina móvil a máquina fija.

TUBING SLIPS

Built to fit 1¼" to 4" tubing, in regular type (for medium depths) and deepwell type for long strings. One man handles it. Made in 4 and 6-segment construction forged steel throughout. Reduces tubing pulling time 25%, with proportionate oil savings.

Prévus pour tubage de 1¼ à pouces, en type normal (pour profondeurs moyennes) et type de puits profonds pour longues colonnes. Un homme suffit à la manoeuvre. Rien qu'en acier forgé en structure de 4 et 6 segments. Réduit le temps de traction de tubage de 25% avec économies de pétrole en rapport.

Para adaptarse a tubos de 1¼" a 4", en tipo normal (para profundidades medianas) y en tipo de pozo profundo para series o columnas bien largas. Un hombre es suficiente para su manejo. Construcción de 4 y de 6 segmentos, de acero forjado. Reduce el tiempo de extracción de la tubería como 25% y produce correspondientes economías en petróleo.



W-K-M Company, Inc.

OIL FIELD, PIPE-LINE & INDUSTRIAL EQUIPMENT

HOUSTON, Texas, U. S. A.

Export Office: 74 Trinity Place, New York

Cable Address: "WILKOMAC"

conditions. He has learned many interesting things and is applying this knowledge to development and production methods.

The first object is to maintain the crude oil in the reservoir at as near its original viscosity as possible. This can be done only by maintaining within the oil the occluded gas which nature placed there. The rate of flow of the oil to and out of the well must be controlled and gas-oil ratios must be maintained as low as possible and still release enough energy to carry the oil to the surface.

If produced properly nature will aid, for the oil escaping with the minimum of gas and produced under proper back-pressure control is in a highly misted state. It reaches the surface thoroughly broken up into a finely divided state and is precipitated as fluid only as pressure and velocity of stream are reduced. This column of mist is lighter than a column of crude oil and gas mixed, and therefore less energy actually is required to deliver a barrel of this kind of misted oil to the surface than would be necessary to deliver a barrel of liquid crude oil devoid of any gas.

The next problem is to maintain formation pressure as near the original pressure as possible. This can be done by extracting the gas that has lifted the oil to the surface, passing it through a natural gasoline plant and extracting the gasoline. The stripped gas then is delivered to high-compression compressors and the gas pressure brought up to as near formation pressure as possible. In one field gas repressured for delivery into the formation from which it was taken is compressed until a cubic foot of it weighs approximately 16 pounds, or about one-fourth as much as water. This condition has been brought about by compressing the gas to 3,500 to 3,750 pounds per square inch, which is about equal to formation pressure. The column of gas weighed about 10.8 pounds per hundred feet and at the face of the formation exerted a pressure of about 896 pounds plus the pressure supplied by compression. Deducting friction losses, it has been found that the pressure in the formation is now about 100 pounds in excess of the original formation pressure.

It follows that any gas in solution in the oil is not permitted to escape while the oil is moving through the pore spaces in the sand and the oil is therefore in its original state of viscosity. If this condition can be maintained it seems probable that 60 per cent or more of the crude oil in the reservoir will be recoverable by natural flow. It is probable there will be a slow decrease in formation pressures, but it is hoped the decrease will be so slight that for practical purposes the oil viscosity will be unchanged during the producing life of the field.

That method of production is almost ideal and if it can be maintained there will be a saving in initial investment because fewer wells will be necessary to recover the oil and recovery equipment will not be needed.

Where it is not possible to maintain original formation pressures another set of conditions will exist. As the pressure is reduced a portion of the gas will tend to precipitate as fluid and mingle with the crude oil and be produced along with it. This precipitation has been called "retrograde condensation," and it presents a problem because it is feared that much of the precipitate will be trapped in the pore spaces in the sand and be difficult of recovery later. However, if stripped gas is returned to the reservoir it is hoped it will tend to take up much of this precipitate and carry it to the well as the gas makes its escape from the formation. It is also believed this stripped gas will have a tendency to take up much of the oil clinging to the sand grains and in this way scour them of otherwise unrecoverable oil.

It is known that hydrocarbons existing in the reservoir as gas under high pressures and relative-

seurs de haute compression et la pression du gaz y est amenée aussi près que possible de celle du gisement. On cite le cas d'un chantier où du gaz remis sous pression pour retourner au gisement d'où il avait été extrait est comprimé jusqu'à ce qu'un pied cube de ce gaz pèse environ 16 lbs., soit ¼ environ du poids de l'eau. On est arrivé à ce résultat en comprimant le gaz sous une pression de 3.500 à 3.750 lbs. par pouce carré, ce qui est à peu près la pression de gisement. La colonne de gaz pesait environ 10,8 lbs. par cent pieds et exerçait sur la face du gisement une pression d'environ 896 lbs. plus la pression de compression. Après déduction des pertes de frottement, on a calculé que la pression dans le gisement dépasse maintenant d'environ 100 lbs. celle qui y existait à l'origine.

Il s'ensuit que tout gaz en solution dans le pétrole n'a pas la chance de se dégager pendant que le pétrole circule à travers les pores du sable et que le pétrole conserve par suite son état de viscosité naturel. Si l'on peut maintenir cet état il semble probable qu'on pourra extraire par jaillissement naturel 60 pour cent ou plus du pétrole brut du gisement. Sans doute il faut s'attendre à une diminution graduelle des pressions de gisement, mais on compte que cette diminution sera si faible que, en pratique, la viscosité du pétrole restera la même pendant toute la durée de production du champ.

Cette méthode de production est presque l'idéal, et chaque fois que les conditions s'y prêtent un peu il y aura une économie en mise de fonds initiale due au moindre nombre de puits nécessaires pour extraire le pétrole et à ce qu'on pourra se passer de matériel d'extraction.

Là où il ne sera pas possible de maintenir les pressions de gisement originales, on sera en présence d'un autre ensemble de conditions. Quand la pression faiblira une partie du gaz tendra à se condenser et à se mélanger au pétrole brut pour être produit en même temps que lui. Cette précipitation a reçu le nom de "condensation rétrograde" et offre un problème car on craint fort qu'une bonne partie du produit de condensation soit emprisonnée dans les pores du sable et difficile à extraire ensuite. Toutefois, si on fait retourner au gisement du gaz dépouillé on compte qu'il tendra à se charger d'une bonne partie de ce produit de condensation et à l'amener à la surface en se dégageant. On est aussi enclin à penser que ce gaz dépouillé aura tendance à se charger d'une bonne partie du pétrole accroché aux grains de sable et ainsi à recouvrer du pétrole autrement irrécupérable.

On sait que les carbures d'hydrogène qui existent dans le gisement sous forme de gaz grâce aux fortes pressions et aux températures relativement élevées régnantes condensent des liquides dès que la pression baisse. Il n'est pas nécessaire de baisser la température, mais il est possible qu'un certain refroidissement se produise par suite de la détente du gaz lors de la diminution de pression et ceci peut faciliter la condensation des liquides.

La grosse question pour les producteurs de champs profonds sous fortes pressions est à l'heure actuelle de conserver l'énergie emmagasinée dans le gisement et de maintenir le pétrole aussi près que possible de son état de viscosité original. Pour cela il faut tout d'abord séparer le pétrole brut et le gaz à la sortie du puits. On peut stabiliser le pétrole en le chauffant et en en extrayant les fractions légères qu'on joindra au gaz naturel qui accompagne le pétrole. On fait alors passer ce mélange de fractions d'hydrocarbures évaporés et de gaz naturel à travers une installation d'essence naturelle où on en extrait l'essence. Il y aura une certaine condensation de liquide dans les séparateurs de pétrole et gaz par suite de la perte de vitesse et de pression. Ce produit de condensation sera traité comme distillé et mélangé à l'essence naturelle. Le puits produira alors du pétrole brut, du distillé et de l'essence naturelle.

Il s'agit ensuite de comprimer le gaz dépouillé sous des pressions assez fortes pour en permettre le retour au gisement d'où il avait été extrait et ainsi maintenir les pressions de gisement. Si on arrive à maintenir ces pressions la condensation de gaz sera insignifiante, la viscosité du pétrole brut sera peu changée et le rendement final de l'extraction élevé.

Si la pression de gisement vient à faiblir, il y aura une certaine condensation des gaz. Ce liquide de condensation se mélangera au pétrole brut et sera produit avec lui et une partie des produits de condensation et du pétrole brut qui auront pu être retenus par les pores du sable seront plus tard repris et extraits par le gaz remis en circulation dans le puits. Le procédé peut paraître compliqué, mais il y a du matériel moderne pour effectuer toutes ces opérations et le prix de revient total pour la mise en oeuvre et la production de gisements à grande profondeur sera assez bas pour en autoriser l'exploitation.

versas condiciones de temperatura y presión. Ha aprendido muchas cosas interesantes y está ya aplicando este conocimiento al mayor perfeccionamiento de las métodos de producción.

El primer objectivo es mantener el petróleo crudo en al yacimiento lo más cerca posible de su viscosidad original. Esto se puede hacer únicamente manteniendo dentro del petróleo el gas inherente que puso en él la naturaleza. La velocidad con que en petróleo llega al pozo y sale de él debe regularse, y las relaciones entre el gas y el petróleo deben mantenerse lo más bajo que se pueda, para consumir la energía de presión que sólo sea absolutomente necesaria para levantar el petróleo a la superficie.

La extracción racional cuenta con la ayuda de la misma naturaleza, pues el petróleo que sale con un mínimo de gas y se produce bajo adecuada contrapresión, se presenta en estado de conveniente pulverización. Llega a la superficie completamente separado o dividido sólo se precipita, en forma líquido, cuando se reducen la presión y la velocidad del chorro. Esta columna de petróleo pulverizado es más liviana que la columna de petróleo crudo líquido mezclado con gas. Por esta razón, se requiere menos energía para entregar un barril de esta clase de petróleo pulverizado, a la superficie, que la que se necesita para entregar a la superficie un barril de petróleo crudo líquido exento de todo gas.

El segundo problema es mantener la presión de la formación lo más próxima posible a la presión original. Esto puede hacerse extrayendo el gas, que ha servido para levantar el petróleo a la superficie, y sometiendo este gas a tratamiento en una planta de gasolina natural, para extraerle toda la gasolina. El gas rectificado entra ahora en compresores de gran fuerza. Se comprime aquí bajo una presión casi igual a la que tenía originalmente en el yacimiento. Por ejemplo, en cierto campo petrolífero, el gas recomprimido, para inyectarse en la formación o yacimiento del cual fué extraido, queda comprimido hasta que un pié cúbico de él pesa aproximadamente 16 libras, es decir, como ¼ del peso del agua. Este efecto se consigue comprimiendo el gas bajo una presión de 3.500 a 3.750 libras por pulgada cuadrada, la cual es casi igual a la presión en la formación. En el presente caso, la columna de gas pesó como 10,8 lbs. por cien pies, y sobre la cara de la formación o yacimiento ejerció una presión de como 896 libras, más la presión de compresión. Descontando las pérdidas por rozamiento, se ha visto que la presión en la formación es ahora como 100 libras mayor que la que existía originalmente.

Es, por lo tanto, evidente, que el gas en solución en el petróleo no puede escaparse mientras el petróleo está pasando por los espacios porosos de la arena, y que el petróleo está entonces en su original estado de viscosidad. De poder mantenerse esta condición, es muy posible que el 60% o más del petróleo crudo en el yacimiento podría recuperarse por emanación o corriente natural. También es probable que sucedan algunas lentas bajadas de presión en la formación, pero se espera que ésto será tan leve que la viscosidad del aceite no sufrirá una apreciable alteración durante el período de productividad del yacimiento.

Semejante método de producción es casi ideal. Al poder mantenerse operativo, ofrece una economía muy considerable en inversión inicial, pues habría necesidad de menos, para la recuperación del petróleo, y por otra parte, no se necesitaría ningún equipo especial de recuperación.

Donde no es posible mantener las presiones originales de la formación, se presentan otras condiciones diferentes. Con la reducción de la presión, parte del gas tenderá a precipitarse en forma líquida y saldrá a la superficie mezclado con el petróleo crudo. Esta precipitación se llama "condensación retrógada" y presenta un problema interesante, a causa de que se teme que gran parte del precipitado puede atrapado en los espacios porosos de la arena y se haga muy difícil recuperarlo más tarde. Sin embargo, se espera que al devolverse al yacimiento el gas rectificado, éste tendrá a tomar mucho de este precipitado, llevándolo al pozo durante su escape de la formación. Se cree también que este gas rectificado tendrá la tendencia a quitar mucho del petróleo adherido a los granos de arena, que no podría recuperarse de ninguna otra manera conocida.

Se sabe que los hidrocarburos existentes en la formación o yacimiento, en estado gaseoso, bajo grandes presiones y temperaturas relativamente altas, se precipitan en forma líquida cuando se les reduce la presión. No es necesario reducir la temperatura, mas es posible que se produzca algún enfriamiento, a consecuencia de la dilatación del gas, mientras se le reduce la presión. Esto puede efectivamente ayudar en la precipitación de los líquidos condensados.

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IDEAL

"Reg. U. S. Pat. Off."

No. FE-27½-B
ROTARY MACHINE

An extra heavy, fully enclosed Unit Type Rotary Machine with a rated drilling depth of 10,000 feet. Modern design and construction have been combined to produce an extremely smooth and true running machine. Generous use of alloy steel throughout this rotary assures safe and efficient operation under the most severe drilling conditions. Abundant lubrication is furnished from two reservoirs, one for lubricating the table bearing and one to lubricate the bevel gears. Each reservoir has a capacity of five gallons. Gross weight prepared for Export, 12,975 pounds.

MACHINE ROTATIVE
No. FE-27½-B

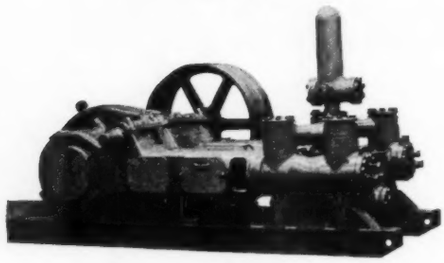
Machine rotative fermée entièrement, extra massive, compléte en elle-mème, permettant de forer jusqu'à une profondeur d'environ 3000 mètres. Une conception moderne alliée à une construction soignée font de cette machine un appareil qui tourne bien rond et fonctionne avec une extrême douceur. L'emploi libéral d'acier spécial qui est fait dans tout ce groupe rotatif en assure la marche efficace et sans danger même dans les conditions de forage les plus défavorables. Deux réservoirs assurent un graissage abondant; l'un est prévu pour le roulement du plateau et l'autre pour les pignons d'angle. La capacité de chacun de ces réservoirs est d'environ 19 litres. Le poids brut du groupe emballé pour l'exportation est de 5885 kg.

MAQUINA ROTATIVA
No. FE-27-½-B

Máquina rotativa, enteramente encerrada, de extraordinaria solidez, para perforar a una profundidad tasada de 3,000 metros. Se han combinado un diseño nuevo y una construcción moderna con el fin de producir una máquina de funcionamiento muy suave y uniforme. El empleo amplio de acero especial en toda esta máquina rotativa permite un funcionamiento seguro y eficaz en los trabajos de perforación más rudos. Dos depósitos suministran lubricación abundancia, uno para lubricar el cojinete de la mesa y otro para lubricar los engranajes cónicos. Cada depósito tiene cabida para cinco galones. Peso bruto, empacada para la exportación, 5885 kilos.

IDEAL

"Reg. U. S. Pat. Off."



C-250
POWER DRIVEN SLUSH PUMPS

These pumps are constructed to meet the severe requirements of modern drilling methods. The power end is very heavily constructed and completely encloses the wide face helical gear drive. Forged Steel Pinion and Cast Steel Gear are heat treated for maximum strength and wear. Valve areas and passages are amply large to prevent turbulent flow and high fluid velocity. Equipped with Ideal FT Pistons, Ideal F-I Steel Valves and Nationalloy Carburized Liners.

These Pumps can now be furnished in the following sizes:

	Gross Weight	Working Pressure
C-350, 7¾"x18", 350 H.P.	36325 lbs.,	3,000 lbs.
C-250, 7¼"x15", 250 H.P.	29860 lbs.,	2,500 lbs.
C-150, 6¾"x12", 150 H.P.	17935 lbs.,	2,000 lbs.
D-50, 5"x10", 50 H.P.	6035 lbs.,	1,000 lbs.

POMPES MÉCANIQUES A LIMON
C-250

Ces pompes sont étudiées pour répondre aux exigences sévères des méthodes de forage modernes. Le côté moteur est d'une construction très robuste; il renferme entièrement la commande à pignons hélicoïdaux très larges. Le pignon en acier forgé et celui en acier coulé sont traités thermiquement afin d'offrir le maximum de force et de résistance à l'usure. La section des vannes et leur ouverture sont amplement grandes pour éviter la turbulence et une vitesse trop rapide du liquide. Ces pompes comportent des pistons IDEAL "FT", des vannes en acier IDEAL "F-I" et des garnitures en "Nationalloy" cémentè.

Ces pompes peuvent être fournies maintenant dans les dimensions suivantes:

	Poids brut	Pression motrice
C-350 7.¾"x18" 350 H.P.	36325 lbs.	3,000 lbs.
C-250 7.¼"x15" 250 H.P.	29860 lbs.	2,500 lbs.
C-150 6.¾"x12" 150 H.P.	17935 lbs.	2,000 lbs.
D-50 5" x10" 50 H.P.	6035 lbs.	1,000 lbs.

BOMBAS MECANICAS PARA EL LODO C-250

Estas bombas han sido construidas para satisfacer las exigencias más severas de los métodos modernos de perforación. La sección motriz ha sido construida con gran solidez y encierra completamente el mecanismo de impulsión por engranaje helicoidal de caras anchas. El piñón de acero forjado y el engranaje de acero fundido son sometidos a un tratamiento térmico para obtener la mayor resistencia y protección contra el desgaste. Las superficies y pasos de la válvula son suficientemente amplios para impedir corrientes turbulentas y alta velocidad del flúido. Van dotadas de émbolos IDEAL "FT", válvulas de acero IDEAL "F-1" y camisas combinadas con carbon "NATIONALLOY".

Estas bombas pueden ser suministradas ahora en los tamaños siguientes:

	Peso Bruto	Presion de funcionamiento
C-350, 7.¾"x18", 350 H.P.	36325 lbs.	3.000 lbs.
C-250, 7.¼"x15", 250 H.P.	29860 lbs.	2.500 lbs.
C-150, 6.¾"x12", 150 H.P.	17935 lbs.	2.000 lbs.
D- 50, 5"x10", 50 H.P.	6035 lbs.	1.000 lbs.

IDEAL

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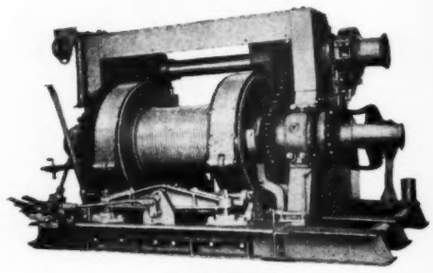

34-26-BDF
DRAW WORKS

A heavy duty, 3-shaft, 4-speed Unit Type Draw Works having solid welded end frames with bearing boxes welded in, and mounted on heavy structural steel base. The base frame can be furnished without extension beyond side frames, or with one end extended as illustrated, or both ends extended to total length of 18 feet. This type of construction combines ease of transportation and installation.

Various optional features of design include—Machine Cut Sprockets with positive lubrication to all chains; Compound Equalizing Brakes with centralized lubrication; Water Cooled Brake Rims; provision for mounting Hydromatic Brake with Idler Sprocket on Rotary Drive. Several combinations of drums and brake rim sizes are available—26" dia. Drum with 46" Rims; 26" dia. Drum with 54" Rims, and 30" dia. Drum with 54" Rims. Gross weight prepared for export, 30735 lbs.

TREUIL
34-26-BDF

Appareil à trois arbres et quatre vitesses comportant des potences massives soudées à l'autogène avec cages de palier serties dedans, le tout monté sur socle en fort acier profilé. Le cadre du socle peut être livré sans rallonge audelà des potences latérales ou avec un seul côté allongé, comme le montre la figure, ou bien encore avec les deux côtés allongés jusqu'à une longueur totale de 18'. Ce genre de construction unit la facilité de transport à celle d'installation.

Sur demande, ces treuils peuvent être livrés avec certaines particularités—Pignons taillés à la machine avec graissage forcé de toutes les chaines; freins compensateurs jumelés avec graissage centralisé; couronnes de frein refroidies par eau; précautions nécessaires pour le montage éventuel d'un frein "Hydromatic" automatique avec pignon fou sur la commande rotative. On peut également fournir diverses combinaisons de tambours avec différentes tailles de couronnes de frein: tambour de 26 pouces de diamètre avec couronnes de 46 pouces; tambour de 26 pouces avec couronnes de 54 pouces et tambour de 30 pouces avec couronnes de 54 pouces. Poids brut emballé pour l'exportation: 13941 kg.

CUADRO DE MANIOBRA (GRUA)
34-26-BDF

Aparato del tipo unitario, de tres árboles, 4 velocidades, para servicio recio, con armazones sólidas soldadas en los extremos, con cajas de cojinetes soldadas en ellas, y van montadas sobre base de acero grueso para construcción. Se puede suministrar la armazón de base sin prolongación fuera de los marcos laterales, o con un extremo prolongado como queda ilustrado, o con ambos extremos prolongados a una longitud total de 18'. Este tipo de construcción proporciona facilidad en el transporte y en la instalación.

Comprende varias características discrecionales en el diseño. Ruedas dentadas trabajadas a máquina con lubricación positiva para todas las cadenas; frenos de compensación combinados con lubricación centralizada; llantas de freno de enfriamiento por agua; disposición para el montaje de freno "Hydromatic" con rueda dentada loca en el mecanismo de impulsión rotativa. Hay disponibles varias combinaciones de tambores y tamaños de llantas de freno — tambor de 26" de diámetro con llantas de 46"; tambor de 26" de diámetro con llantas de 54" y tambor de 30" de diámetro con llantas de 54". Peso bruto, empacada para la exportación, 13941 kilos.

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ly high temperatures will precipitate fluid as the pressure is reduced. It is not necessary to lower temperature, but it is possible some cooling will be effected through the expansion of the gas as pressure is lowered and this may assist in the precipitation of condensed fluids.

The problem now confronting the production men operating deep high-pressure fields is to conserve the formation energy and keep the oil as near its original viscous state as possible. To do this it is necessary first to separate crude oil and gas at the well-head. The oil may be stabilized by heating and removing the lighter fractions, which will be joined with the natural gas accompanying the oil. This mixture of evaporated hydrocarbon fractions and natural gas is passed through a natural gasoline plant and the gasoline extracted. Some fluid will be precipitated in the oil and gas separators as pressure and velocity are reduced. This will be treated as distillate and mixed with the natural gasoline. The well therefore will produce crude oil, distillate and natural gasoline.

The next step is to compress the stripped gas to pressures high enough to permit it to be returned to the formation from which it was produced and in this way maintain formation pressures. If pressures can be maintained the condensation of gas will be nominal. The crude-oil viscosity will be little changed and ultimate recovery will be high.

If formation decreases, then some gas will be condensed to fluid. This fluid will mingle with and be produced with the crude oil and some of the condensates and crude oil left behind in the pore spaces in the sand will be taken up and later produced with the gas as it again enters the well. The process may seem involved, but modern equipment is available to perform all of these operations and the overall cost of development and production of deep-seated reservoirs will be low enough to justify their exploitation.

STABILIZING CRUDES

More than 15 years ago the use of gas-tight tanks for handling crude oil on the lease was advocated. At that time it was pointed out that the lighter fractions could be retained in the crude oils. These facts were demonstrated, but it was not until the demand for higher-octane fuels became more pronounced that the industry gave serious thought to handling the well products in this manner.

Within the past few years there has been a marked change in the methods of handling crude oil on leases, and now it is becoming common practice to stabilize the oil before delivery to the pipe line system. This is in effect a controlled evaporation of the light fractions of the crude by heating and the precipitation of these light fractions as liquid. It is an evaporation process usually carried on in a vapor-pressure tight gun-barrel type of tank in which the oil and water from the well are handled after the well's production has passed through an oil and gas separator and the gas has been removed.

The oil and water enter at the top of a flume in the pressure-tank and escape from openings near the bottom of the tank. The oil rises through a water bath. The water is kept at constant level in the treatment-tank and is also heated by circulating it through an outside heater. Thermostatic control regulates the temperature of the wash-water and any excess water escapes from the tank through a syphon.

The heating of the oil tends to drive off the light fractions, and they are drawn off and delivered to natural gasoline plants. The weathered oil is delivered to tight storage lease-tanks.

This system of stabilization of the crude oil is used in the Tepetate field, Louisiana, in connec-

(Continued on Page 218)

STABILISATION DES PETROLES BRUTS

Il y a plus de 15 ans on préconisait l'emploi de réservoirs étanches aux gaz pour la manutention des pétroles bruts sur la concession. L'avantage qu'on signalait alors était qu'on pouvait ainsi retenir les fractions légères dans les pétroles bruts. Ces faits étaient démontrés, mais ce ne fut que lorsque la demande en carburants à octanes de séries élevées devint plus forte que l'industrie s'intéressa vraiment à ce genre de manutention des produits du puits.

Au cours de ces dernières années il y a eu un changement marqué dans les méthodes de manutention du pétrole brut au chantier, et il est devenu très courant de stabiliser le pétrole avant de le confier au réseau des pipe-lines. Il s'agit en fait d'une évaporation contrôlée des fractions légères du pétrole par la chaleur et de la précipitation de ces fractions légères à l'etat liquide. C'est une opération d'évaporation qui a lieu en général dans un réservoir du type canon de fusil étanche à la pression des vapeurs où aboutissent le pétrole et l'eau extraits du puits après que ceux-ci ont passé à travers d'un séparateur de pétrole et de gaz où le gaz s'est séparé.

Le pétrole et l'eau entrent dans le réservoir à pression par une rigole inclinée et en sortent par des ouvertures tout près du fond du réservoir. Le pétrole monte en traversant un bain d'eau. L'eau est maintenue à un niveau constant dans le réservoir à traitement et est aussi chauffée en la faisant circuler à travers un réchauffeur extérieur. Un thermostat règle la température de l'eau de lavage et tout excès d'eau s'échappe du réservoir au moyen d'un syphon.

La chaleur tend à chasser du pétrole les fractions légères qui en sont ainsi extraites et dirigées sur les fabriques d'essence naturelle. Le pétrole ainsi stabilisé est mis en réservoirs de magasinage étanches sur le chantier.

Ce mode de stabilisation des pétroles bruts est employé dans le champ de Tepetate, Louisianne, en relation avec l'extraction de l'essence naturelle et avec des installations de remise sous pression où se prépare le gaz résiduaire destiné à retourner à la formation pour y maintenir la pression. Ce procédé très perfectionné sera discuté plus en détail ailleurs.

POMPAGE

Les opérateurs ont installé un nouveau matériel de pompage là où on en avait besoin et nettoient leurs puits plus souvent. Etant donné qu'on a

(Continué sur Page 218)

El problema que enfrentan los explotadores de yacimientos profundos y de alta presión es conservar la energía o presión de la formación y mantener el petróleo lo más próximo posible a su viscosidad original. Para ésto, es necesario separar primeramente el petróleo crudo del gas, en la boca del pozo. El petróleo puede estabilizarse por calentamiento y extracción de las fracciones más volátiles, las cuales se juntan con el gas natural que acompaña al petróleo. Esta mezcla de fracciones de hidrocarburo evaporadas y gas natural, es pasada por una planta de gasolina natural, en la cual se le extrae la gasolina. En los separadores de petróleo y gas se precipitará cierta cantidad de líquido, debido a la reducción de la presión y velocidad. Este líquido se trata entonces como destilado y se mezcla con la gasolina natural. El pozo producirá, por lo tanto, petróleo crudo, destilado y gasolina natural.

El paso siguiente es comprimir el gas rectificado, bajo presiones bastante altas para que pueda mantener, lo más que se pueda, las presiones de la formación de la cual fué extraido y a la cual es ahora devuelto. La condensación del gas resulta muy nominal cuando se mantienen las presiones de la formación a correcto grado. La viscosidad del petróleo crudo tendrá poco cambio y su recuperación final será muy considerable.

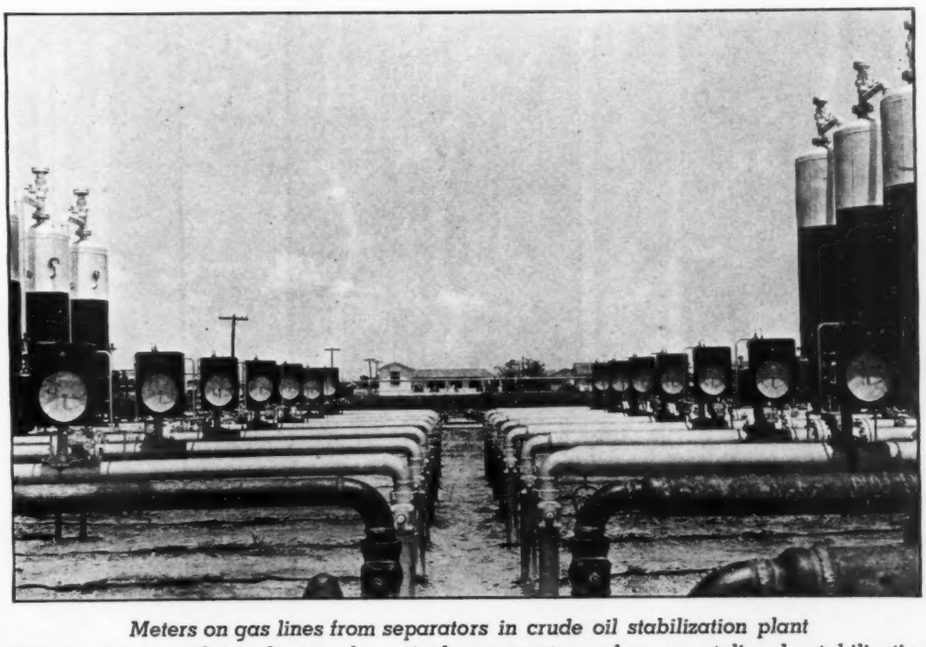
Al reducirse las presiones de la formación, parte del gas se condensará entonces en forma líquida. Este líquido se mezcla con el petróleo crudo y sale con éste, y parte de los condensados y el petróleo crudo remanentes en los espacios porosos de la arena, salen más tarde, bajo la presión del gas que se inyecta de nuevo en el pozo. El procedimiento parece intricado, pero en realidad, no lo es, pues hay ahora equipo moderno para hacer todas estas operaciones y el costo total del desarrollo y producción de los yacimientos profundos resulta así bastante económico para justificar la explotación.

ESTABILIZACION DEL PETROLEO CRUDO

El uso de tanques herméticos al gas, para el manejo del petróleo crudo, en la misma propiedad, fué recomendado a la industria hace más de 15 años. En ese tiempo se advirtió que las fracciones más volátiles o livianas podían retenerse en los petróleos crudos. Esto fué demostrado; pero la industria no dió seria consideración al manejo de los productos del pozo, de esta manera, sino hasta que vió una creciente demanda popular de combustibles de elevado octano.

En estos últimos pocos años, ha habido un notable cambio en los métodos de manejar el petróleo crudo en la misma propiedad y se está haciendo

(Continué en Página 218)



Meters on gas lines from separators in crude oil stabilization plant
Compteurs sur conduites de gaz a la sortie des separateurs dans un atelier de stabilisation de petrole brut
Contadores en tuberias de gas de separadores en instalaciones de estabilizacion de petroleo crudo

GRANT TOOLS

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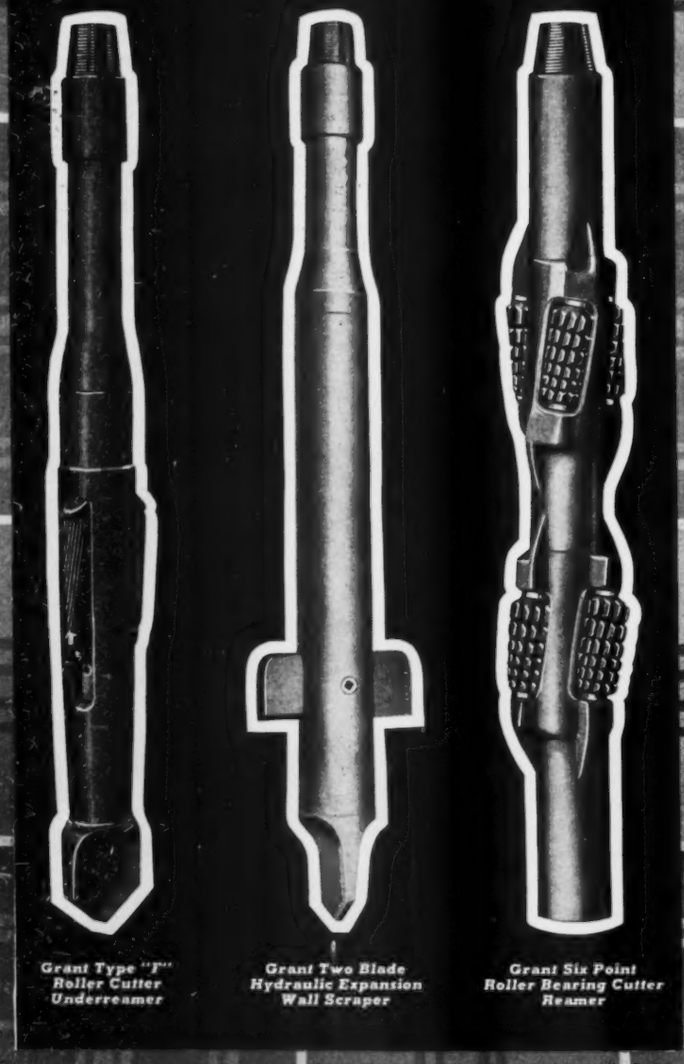

Grant Type "F" Roller Cutter Underreamer

Grant Two Blade Hydraulic Expansion Wall Scraper

Grant Six Point Roller Bearing Cutter Reamer

Grant-Champion "L" Type Rotary Hose

Grant Hydrostatic Cleaner

Grant Hydrostatic Bailer

SINCE 1914 the Grant Oil Tool Company has been making oil field tools for certain specific purposes. Never yet has one of these tools been manufactured and offered to the industry simply on the *theory* that it would do the job. On the other hand, every tool and every improvement of that tool has been based on *known, definite* needs of the industry, to meet certain problems connected with the drilling and proper production of oil wells. They are *geared to the specific job* for which they are constructed. They are recommended for the definite performance of one job and not as jacks-of-all-trade. They are, every one of them, constructed with the very fewest and simplest of parts, thus minimizing danger of breakage and cost of replacement. And, last but not least, into them is built the fundamental principle of long and useful life. Summed up, Grant Tools are the result of constant association and contact with men in the industry *who know*, together with an accumulation of field experience which has provided us with a knowledge that has resulted in the building of tools for *maximum performance value* on any given job.

Separate bulletins illustrating and describing construction details, assembly operations and field application under varying conditions, have been specially prepared on each of these tools and will be gladly furnished upon request.

DEPUIS 1914 la Grant Oil Tool Company n'a pas cessé de fabriquer des outils de champs de pétrole pour certains usages précis. Jamais encore aucun de ces outils n'a été fabriqué et offert à l'industrie simplement en se basant sur la *théorie* qu'il irait toujours bien. Au contraire, chaque outil et chaque perfectionnement à cet outil a été basé sur des besoins *connus, précis* de l'industrie, afin de répondre à certains problèmes de forage et de production rationnelle de puits de pétrole. Ils sont *étudiés pour le travail spécial* auquel ils sont destinés. Ils sont recommandés pour accomplir une opération particulière et non comme outils bons à tout. Ils sont, tous sans exception, construits avec le strict minimum de pièces les plus simples possibles, d'où réduction au minimum des risques de rupture et des frais de remplacement. Enfin, mais de toute première importance, on leur a appliqué le principe fondamental de longue vie utile. En résumé, les outils Grant sont le résultat de contacts et de rapports constants avec les experts de la partie *qui savent*, ainsi qu'une accumulation d'expérience sur chantier, ce qui nous a assuré une connaissance dont le fruit a été la construction d'outils *d'un rendement maximum* pour tout travail donné.

Des bulletins séparés illustrant et décrivant les détails de construction, les opérations de montage et l'application au chantier dans des conditions variables, ont été spécialement préparés pour chacun de ces outils et seront fournis avec plaisir sur demande.

DESDE 1914, la Grant Oil Tool Company ha venido fabricando herramientas para ciertos definidos trabajos en campos petrolíferos. Hasta ahora no se ha fabricado y ofrecido a la industria ninguna de estas famosas herramientas sencillamente sobre la *teoría* de que pueda hacer el trabajo. Por otra parte, cada herramienta y todo refinamiento introducido en esa herramienta, se han basado sobre necesidades definidas y bien conocidas de la industria, para resolver ciertos problemas relacionados con la perforación y la producción correcta de pozos de petróleo. Estas herramientas están *adaptadas a los trabajos determinados* para la ejecución de los cuales han sido especialmente fabricadas. Se recomiendan para la ejecución exacta de sus correspondientes trabajos especiales y no para hacer malamente numerosos trabajos de índole diversa. Cada una de ellas consta del menor número posible de piezas y las mismas piezas son de una sencillez extrema, para reducir el peligro de rotura y disminuir a un mínimo los gastos de repuesto. Y por último, pero no por fin, se introducen en ellas todos esos factores que contribuyen a gran duración y utilidad práctica. En resúmen, las herramientas Grant son el resultado de una constante asociación y contacto con hombres prácticos de la industria *que saben* lo que se necesita, en combinación con una gran acumulación de experiencia en el ramo, lo que nos ha dado un conocimiento exacto de la situación, para fabricar herramientas *del mayor valor práctico posible* para el trabajo dado a que cada una está destinada.

Hemos preparado boletines especiales para cada una de esta herramientas, que gustosamente enviaremos a solicitud del interesado. En estos boletines describimos en detalle la construcción, las operaciones de montaje y las aplicaciones prácticas bajo variables condiciones.

GRANT OIL TOOL COMPANY

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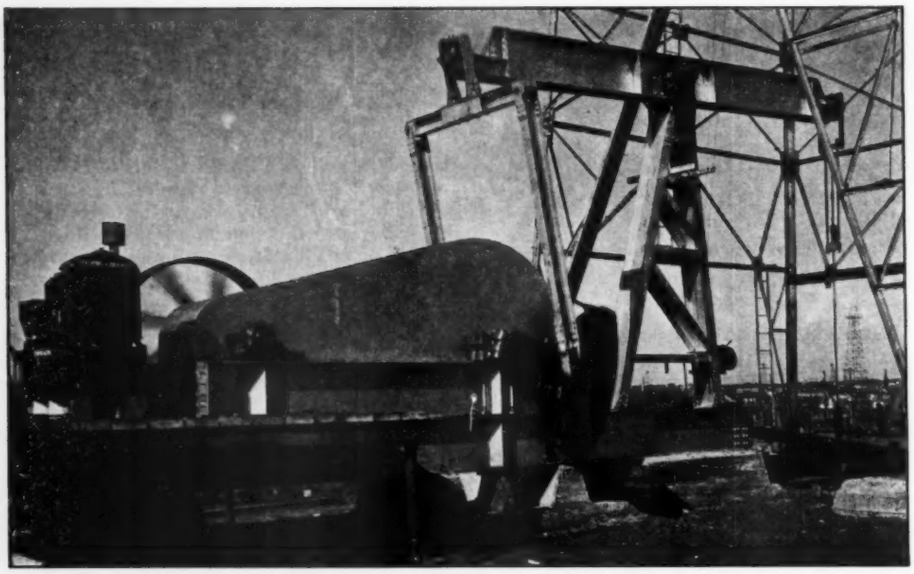

Internal combustion engine powered pumping unit
Groupe-force electrogene a moteur a combustion interne pour appareillage rotatif
Generador electrico accionado por motor de combustion interna para el funcionamiento de una maquina rotativa

tion with natural gasoline extraction and recompressing plants used to prepare the residue gas for return to the formation for the purpose of pressure maintenance. This highly developed process will be discussed elsewhere.

PUMPING

Operations have installed new pumping equipment where it was needed and clean out their wells more frequently. Since it was found necessary to pump wells of greater depth much consideration has been given to regulation of surface equipment to give maximum life to subsurface equipment. A string of sucker-rods over 8,000 feet in length is in use at Santa Fe Springs, Calif., and a 7,500-foot string has been installed in an 8,500-foot Kettleman Hills, Calif., well, the first well in the field to be put on the beam. Newer types of deep-well pumps, such as the hydraulic pump and the bottom-hole electrical pump, have established themselves as necessary items of oil field equipment, having completely emerged from the proving stage.

The individual pumping unit and the truck-mounted well-servicing unit have become standard in most of the more recently developed pumping areas. Economies of this kind have made the well which is drilled in as a pumper a far more attractive investment. Drilling and producing of some California pumping wells have reached a high degree of organization. Development of extensive acreage is undertaken with a few portable rigs. When a well is completed the rig is immediately moved to a new location where a derrick has been erected, and all is in readiness for the commencement of drilling. Before the well is drilled the concrete foundation for the pumping unit is erected. This is done when the derrick floor and derrick foundation are poured.

DEEP-WELL DRILLING

No developments during 1937 were more impressive than the great increase in depth of drilling. At the end of the first week of 1937 a new

trouvé nécessaire de pomper des puits plus profonds on a veillé avec soin à régler le matériel de surface afin de donner une vie utile maximum au matériel souterrain. Une colonne de tiges aspiratrices de plus de 8000 pieds de long est en service à Santa Fe Springs, Calif., et une colonne de 7500 pieds a été posée dans un puits de 8500 pieds à Kettleman Hills, Calif., le premier puits en chantier à être mis sur la poutre. Des types récents de pompes de puits profonds, comme la pompe hydraulique et la pompe électrique à trou de fond, sont devenus des engins nécessaires en matériel de champ de pétrole, étant sortis victorieux de la phase d'essai.

Le groupe de pompage individuel et le groupe de service de puits monté sur camion sont devenus standards dans la plupart des régions de pompage récemment mises en oeuvre. Les économies de ce genre ont rendu le puits foré qu'on exploite par pompage d'un intérêt beaucoup plus grand. Le forage et la mise en oeuvre de quelques puits de pompage de Californie ont atteint un haut degré d'organisation. L'exploitation de vastes étendues est entreprise au moyen de quelques groupes portatifs. Une fois un puits terminé on déplace tout de suite ce groupe en un point nouveau où un derrick a été élevé, et on est ainsi tout prêt à commencer le forage. Avant de forer le puits on pose la base de béton pour le groupe de pompage. Ceci se fait quand on coule le plancher de derrick et les bases de derrick.

FORAGE DE PUITS PROFONDS

Aucun progrès n'a été plus frappant au cours de 1937 que la forte augmentation des profondeurs de forage. A la fin de la première semaine de 1937 un nouveau record de profondeur a été établi en puits producteurs par Rigolets No. 5 de la Texas Co. dans le champ Lafitte de Louisiane. Elle ne tint son record de 10.244 pieds que 10 jours, car il lui fut enlevé par McGonigle No. 12 de la Tide Water Associated Oil Co. qui atteignit 10.569 pieds dans le champ de Ventura Avenue de Californie. Il devint alors clair que l'année allait être une année de forage profond. Par la suite le record fut enlevé par un puits du Golfe du Mexique qui fut foré à près de 1.500 pieds de plus. On ne peut pas attribuer ce grand progrès dans l'amplitude du forage uniquement aux améliorations d'exploitation de cette année. En effet, voilà une bonne décade qu'on travaille à améliorer la technique du forage qui devait un jour rendre possibles ces puits très profonds. On avait ainsi réalisé du matériel de surface de force suffisante pour manier les lourdes charges; on avait réalisé des instruments et des méthodes pour assurer la verticalité des

ahora práctica corriente estabilizar el petróleo antes de su entrega al sistema de tubería transportadora. Esto es, en efecto, una evaporación regulada de las fracciones más volátiles del petróleo crudo, y consiguiente precipitación de estas fracciones en forma líquida. Es, en general, un procedimiento de evaporación, que se lleva a cabo ordinariamente en un tanque de tipo cañón, hermético a la presión del vapor. Dentro de este tanque se manejan el petróleo y el agua del pozo, después de su paso por un separador de petróleo y gas, que quita todo el gas.

El petróleo y agua entran por arriba de un conducto en el tanque de presión y se escapan por orificios cerca del fondo del tanque. El petróleo se levanta a través de un baño de agua. El agua se mantiene a un nivel constante en el tanque de tratamiento y es también calentada por circulación por un calentodar exterior. Un termostato gobierna la temperatura del agua de lavado y todo exceso de agua se escapa del tanque por un sifón.

El calentamiento del petróleo tiende a separar las fracciones volátiles, las cuales se extrean y entregan a las refinerías de gasolina natural. El petróleo oreado pasa a depositarse en los herméticos tanques que hay en la misma propiedad.

Este sistema de estabilización de petróleo crudo se emplea en el campo de Tepetate, estado de Louisiana, en conexión con la extracción de gasolina natural y se utiliza también en las plantas de recompresión, que se usan para la preparación del gas residual, que se devuelve a la formación, con el fin de mantener en ella la presión. Este perfeccionado procedimiento se describe en otro artículo.

BOMBEO

Las compañías de petróleo han instalado nuevos equipos de bombas donde se han necesitado y limpian ahora sus pozos con mayor frecuencia. Desde que se hizo necesario bombear pozos de mayores profundidades, se ha dado mucho estudio a la regulación del equipo superficial, a fin de asegurar una duración máxima al equipo subterráneo. Una serie de varillas de aspiración de más de 8.000 pies de longitud se está empleando en Santa Fe Springs, California, y otra serie de 7.500 pies de longitud se ha instalado en un pozo de 8.500 piés de profundidad en Kettleman Hills, California, el primer pozo en este campo en ponerse en operación por bombeo. Nuevos tipos de bombas para pozos profundos, incluyendo modelos hidráulicos y eléctricos de orificio al fondo, se han establecido como equipos necesarios en los campos petrolíferos, después de pasar por se etapa experimental.

El grupo de bomba individual y el grupo de servicio de pozo, montado en camión, se han hecho equipos corrientes en casi todos lo campos recientemente explorados par explotación. Las economías de esta caracter hacen más conveniente la inversión de capital en pozos por explotarse por bombea. La perforación y la extracción con bomba de algunos pozos en California han llegado a un avanzado grado de organización. Con la ayuda de unos pocos aparejos portátiles se puede emprender el desarrollo de grandes zonas petrolíferas. Después de perforado el pozo, el aparejo se transporta inmediatamente a otro punto, donde se ha establecido ya una torre y está todo listo para comenzar la perforación. Antes de la perforación del pozo, se prepara la base de hormigón para el grupo de bomba. Esto se hace al construirse el piso y la base de la torre.

PERFORACION DE POZOS PROFUNDOS

Ningún desarrollo en 1937 ha sido más impresionante que el gran aumento de profundidad en la perforación de pozos. Al final de la primera semana de 1937, se estableció un nuevo precedente en profundidad de pozo productivo en el campo Rigolets No. 5 de la Texas Company, en Lafitte, estado de Luisiana. Su "record" de 10.244 piés se mantuvo supremo sólo diez días, pues fué entonces aventajado por el pozo McConigle No. 12, de la Tide Water Associated Oil Co., en el campo de Ventura Avenue, California, con una perforación de 10.569 piés. Se hizo evidente que el año iba a ser uno de perforación a grandes profundidades. Más tarde, el record pasó a un pozo de la Gulf Coast, que fué perforado a una profundidad de 1.500 piés más que los otros. Este gran aumento en grado de profundidad no debe atribuirse a per-

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SEISMOGRAPH SURVEYS

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in experience, in methods, in transportation facilities and in shot-hole drilling equipment are essential for seismograph work outside of the United States. Independent Exploration Company, which has conducted seismograph surveys in 21 States under a greater variety of conditions than any other seismograph contractor, is equipped with the most readily portable, light, and compact as well as the most sensitive seismographs available. We offer a variety of completely equipped trucks and trailers in which the instruments are housed for operation under various road conditions, but where necessary the instruments can easily be carried by men or animals. Our shot-hole drilling equipment ranges from drilling machines which can be carried by two men, and demountable machines which can be packed on six mules for transport over narrow trails, to truck-mounted hydraulic rigs equipped for rapid transportation. Inquiries as to details will be promptly answered.

DIVERSITE

en expérience, en méthodes, en facilités de transport et en matériel de forage perce-trous, autant de conditions essentielles en travaux sismographes en dehors des Etats-Unis. La Independent Exploration Company, qui a conduit des prospections au sismographe dans 21 Etats et dans des conditions plus variées que tout autre entrepreneur au sismographe est équipée avec les sismographes du marché possédant le plus haut degré de portabilité, légèreté, compacité et aussi sensibilité. Nous offrons une variété de camions et de remorques complètement équipés où les instruments sont logés pour emploi dans diverses conditions de parcours, mais là où il est nécessaire que les instruments puissent être facilement portés par hommes ou animaux. Notre matériel de forage percetrous va des machines de forage qui peuvent être portées par deux hommes, et nos machines démontables qui peuvent être emballées sur six mules pour transport sur chemins étroits, jusqu'aux groupes hydrauliques montés sur camion et équipés pour transport rapide. Prompte réponse aux demandes de détails complémentaires.

DIVERSIDAD

en experiencia, en métodos, en facilidades de transporte y en equipo de perforación de pozos, son cosas absolutamente esenciales para emprender estudios sismológicos afuera de los Estados Unidos de América. La Independent Exploration Company, que ha emprendido y realizado estudios sismológicos en 21 estados de este país y bajo una mayor variedad de condiciones que todo otro contratista del ramo, está equipada con los sismógrafos más portátiles, livianos, compactos y sensitivos del mercado. Ofrecemos una variedad de camiones y de remolques completamente equipados, en los cuales los intrumentos van correctamente dispuestos para el funcionamiento bajo diversas condiciones de camino, pudiendo quitarse, para su transporte por hombres o por animales, cuando sea necesario. Nuestro equipo de perforación es la última palabra en el ramo, comprendiendo desde máquinas de perforación, que pueden llevarse por dos hombres, máquinas desmontables, que pueden llevarse sin dificultad por seis mulas, por senderos estrechos, hasta aparejos hidráulicos, montados en camiones, para rápido transporte. Daremos inmediata respuesta a toda solicitud de información detallada.

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Representative of the *Representante de la* *Représentant de la*

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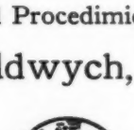
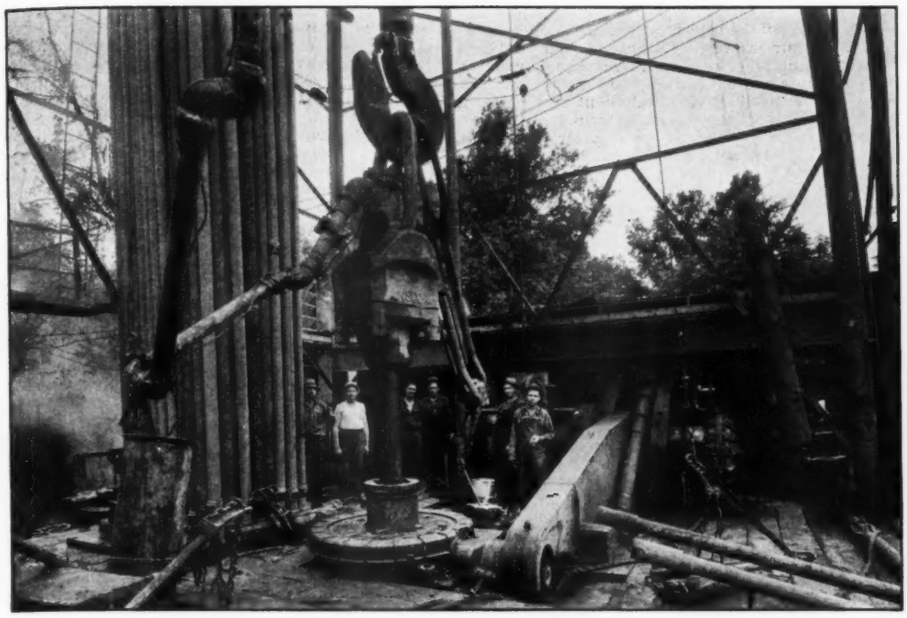




Type of equipment used for 10,000-foot rotary drilled holes
Type de materiel employe pour puits de 10.000 pieds fores au rotatif
Tipo de equipo empleado para pozos de 10.000 pies perforados con rotativa

depth record was established for producing wells by Texas Co. No. 5 Rigolets in the Lafitte field of Louisiana. Its record of 10,244 feet was held only 10 days before it was broken by Tide Water Associated Oil Co. No. 12 McGonigle, which produces from 10,569 feet in California's Ventura Avenue field. It became apparent that the year was to be one of deep drilling. Later the record was seized by a Gulf Coast well which was drilled almost 1,500 feet deeper. This great increase in the range of drilling cannot be entirely attributed to operating improvements of this year. Throughout the last decade men have been working toward the improvement of drilling technique, which was to make these deep wells possible. They were designing surface equipment with sufficient strength to handle the heavy loads; they were devising instruments and methods for keeping wells vertical; and they were experimenting with mud and methods of keeping it in satisfactory condition. As a result, the drilling of 10,000- or 11,000-foot wells is now undertaken without a great deal of hazard.

More important than the records established by deep wells is the economical importance of the additional reserves discovered by them. In the North Dome of Kettleman Hills the discovery of the 10,000-foot Eocene sand has greatly improved the field's prospects, and a possible Cretaceous producer is being searched for. The new Rio Bravo field west of Bakersfield, Calif., which was discovered by an 11,302-foot well, is believed to be the most important California discovery since Kettleman Hills.

PROTECTION OF OIL SAND DURING DRILLING

During 1937 much attention was given to the subject of avoiding injection of circulating fluid into the productive strata during completion of wells. While no new methods of preventing injury were developed, existing methods received more widespread acceptance than at any time during the past. Pressure-drilling methods received most attention. In areas such as California, where these methods were believed to be valueless because of subsurface conditions, good results have been obtained through their use. However, as a rule, Cali-

puits; et on avait fait des essais sur les boues et les moyens de les maintenir dans un état satisfaisant. C'est grâce à tout cela qu'on peut maintenant entreprendre sans grand risque le forage de puits de 10.000 ou 11.000 pieds de profondeur.

Plus important encore que les records établis par les puits profonds est l'intérêt économique des réserves additionnelles ainsi découvertes. Dans le Dome Nord des Kettleman Hills la découverte du sable Eocene de 10.000 pieds d'étendue a beaucoup amélioré l'avenir du champ, et on est en quête d'un gîte producteur crétacé. Le nouveau champ de Rio Bravo à l'Ouest de Bakersfield, Calif., qui a été découvert par un puits de 11.302 pieds, est considéré comme la plus importante découverte de Californie depuis les Kettleman Hills.

PROTECTION DES SABLES PETROLIERS PENDANT LE FORAGE

Au cours de 1937 on s'est beaucoup occupé de la question d'éviter l'injection de liquide en circulation dans les couches productives pendant l'aménagement des puits. Bien qu'on n'ait pas mis au point de nouvelles méthodes pour prévenir cette avarie, les méthodes existantes ont eu une plus grande vogue qu'a aucune époque dans le passé. On s'est surtout intéressé aux méthodes de forage sous pression. Dans des régions comme la Californie où on croyait ces méthodes sans intérêt à cause des conditions du sous-sol, on a obtenu de bons résultats par leur emploi. Mais, en général, les producteurs de Californie ne laissent pas leurs d'éboulement. C'est pour cette raison qu'on ne puits produire pendant qu'on les fore par la méthode de forage sous pression à cause du danger laisse circuler que juste assez de gaz avec le liquide pour réduire la pression hydrostatique à un point où on ne perdra pas de ce liquide à la formation. On remplace la boue par du pétrole pendant le forage de la zone qui rapporte. Bon nombre d'autres puits sont forés avec du pétrole auquel on n'a pas ajouté de gaz, et d'autres sont forés par l'emploi de boue fluide à laquelle on a ajouté une substance colloïdale ou fibreuse afin d'empêcher le liquide de pénétrer dans les interstices du sable producteur. Il est maintenant très rare qu'on fore un puits sans tenir compte de l'effet du liquide en circulation sur le sable. Dernièrement on a préconisé une méthode chimique dans bien des régions. Elle consiste à ajouter du carbonate de calcium à la boue de forage. Une fois le puits terminé et la chemise en place, on introduit de l'acide pour désagréger toute boue ayant pu rester ou adjacente à la zone payante.

feccionamiento de operación durante el año. Todos estos últimos diez años, los ingenieros han estado trabajando en el sentido de perfeccionar la técnica de la perforación, que un día iba a hacer posible semejantes pozos tan profundos. Durante todo este tiempo estuvieron ideando un equipo superficial con suficiente fuerza para manejar las cargas más grandes; estuvieron inventando instrumentos y métodos para conservar verticales los pozos, y estuvieron haciendo experimentos con el barro o lodo y métodos de conservarlo en condiciones satisfactorias. Como resultado de toda esta preparación, la perforación de pozos de 10.000 o de 11.000 piés de profundidad se emprende ahora sin gran riesgo.

Más importante que los "records" o precedentes establecidos por los pozos profundos es el valor económico de las reservas adicionales que se han descubierto con ellos. En la región North Dome de Kettleman Hills, el descubrimiento, a 10.000 piés de profundidad, de un yacimiento de arena de período eoceno, ha notablemente mejorado las espectativas de este campo, y se presenta probable la existencia aquí de un productor de caracter cretáceo. El nuevo campo de Rio Bravo al oeste de Bakersfield, California, descubierto mediante un pozo de 11.302 pies de profundidad, se cree que es el yacimiento más importante de todos los hallados en esta región, desde el escubrimiento de Kettleman Hills.

PROTECCION DE LA ARENA PETROLIFERA DURANTE LA PERFORACION

Durante 1937 se dió mucha atención al asunto de evitar la inyección de líquido de circulación en la estrata productiva durante la terminación de los pozos. Aunque no se desarrolló ningún método para evitar el daño, los procedimientos existentes recibieron una aceptación más general que en toda otra época pasada. Los métodos de perforación bajo presión recibieron particular atención En regiones como California, donde se creía que estos métodos eran inútiles, a causa de las condiciones subterráneas, se han obtenido puenos resultados de su aplicación. Sin embargo, por regla general, los productores en California no permiten que haya salida de sus pozos mientras se están perforando por el método de presión, debido al peligro de que se hundan. Por esta razón, se circula sólo suficiente gas con el líquido, para reducir la presión hidrostática hasta un punto en que no se pierda ningún flúido de la formación. El petróleo reemplaza al barro durante la perforación del pozo. Muchos otros pozos se perforan con petróleo, sin que se le añda gas, y otros se perforan con barro liviana, al cual se agrega algún material coloidal o fibroso, para evitar que el líquido penetre en los intersticios de la arena petrolífera. Pocos son los pozos que se perforan ahora sin consideración al efecto del líquido de circulación sobre la arena. En varias regiones se ha introducido últimamente, con buenos resultados, un nuevo procedimiento químico, que consulta la adición de carbonato de calcio al barro de perforación. Después de completado el pozo y colocado el forro en su debido sitio, se inyecta ácido para disolver o separar todo barro que haya quedado metido en la zona productiva o adyacente a ésta.

EMPAQUE DE GRAVA DE LOS FORROS

En California, los resultados obtenidos por la Texas Company, con el empleo de forros empacados con grava o cascajo, ha despertado la atención de otras empresas petroleras. En algunos casos, la terminación de pozos mediante este procedimiento, ha mostrado una considerable ventaja en productividad, en comparación con otros pozos cercanos, pero la razón principal de este nuevo procedimiento ha sido evitar inconvenientes con la arena. La elección de los tamaños de la grava se basa sobre la suposición de que se conveniente retener toda la arena en la formación, salvo la más fina o molida, que sale fácilmente al extraerse el petróleo por bombeo. Se emplea grava de río cernida por criba de ¼ a ⅜" por lo general. Ordinariamente se coloca un forro o camisa de 6⅝" en un hoyo que ha sido agrandado a cerca de 16" de diámetro por la zona productiva. El espacio alrededor del forro se empaca con la grava. Esto

fornia producers do not permit their wells to flow while they are being drilled in with the pressure-drilling method because there is danger of caving. For this reason only enough gas is circulated with the fluid to reduce the hydrostatic pressure to a point where no fluid will be lost to the formation. Oil is substituted for mud during drilling of the pay. Many other wells are drilled in with oil, to which no gas is added, and others are drilled in using light mud to which colloidal or fibrous material has been added to prevent the fluid from penetrating into the interstices of the pay sand. Very few wells are now being drilled where no regard is given to the effect of the circulating fluid upon the sand. A chemical method has lately come into favor in many quarters. This calls for the addition of calcium carbonate to the drilling mud. After the well has been completed and the liner is in place, acid is introduced to disintegrate any mud remaining in or adjacent to the pay zone.

GRAVEL PACKING OF LINERS

In California the interest of other operators has been attracted by results obtained by the Texas Co. through the use of gravel-packed liners. In some cases completions of this sort have shown a considerable advantage in productivity over surrounding wells, but the chief reason for this procedure has been to avoid sand troubles. Selection of gravel sizes is based on the assumption that it is desirable to retain all of the sand in the formation except the fine flour sand, which is readily pumped with the oil. Screened river gravel is used, usually one-quarter inch to three-eighths inch mesh. Usually a 6⅝-inch liner is set in a hole which has been reamed out to about 16 inches diameter through the producing zone. The space around the liner is packed with gravel. This is done by adding the gravel to drilling fluid of the proper consistency, pumping the fluid down the outside of the drillpipe upon which the liner is hung. The mud returns to the surface through the inside of the drillpipe, while the gravel is screened out at the bottom of the liner. Mud later is washed from the gravel with water. Liners used are lined with cement sleeves which force the gravel-carrying mud to pass around the bottom of the liner before returning to the surface. After placement of the gravel the cement is drilled out to expose the perforations of the liner. It is reported this advanced type of well completion has reduced cleanout time to one-sixth of that necessary with the standard form of completion.

METALS AND ALLOYS

Developments in the use of metals in production are not spectacular. Nevertheless, each year shows a more widespread use of alloy steels for production tools and equipment. It is now common practice to utilize low-percentage alloy steels for sucker-rods, chains and hooks, tool and valve bodies, pistons, shafts and polish-rods and pins and cutters on rotary tools. In fact the use of special steels in production are the uses that are now becoming common for all machinery.

The steels used in production contain a relatively small amount of alloy element and the special element is added mainly for the purpose of gaining strength rather than a resistance to corrosion. The tabulation indicates the types of steels that are used but does not list all of the steels that are useful.

These steels are used in the quenched and tempered condition but the low carbon steels are usually carburized and case hardened. The use of alloy steels has permitted stronger and more compact drilling tools and equipment.

The same elements are used in the manufacture of alloy cast irons for such services as engine castings, pistons, brake drums and clutch plates.

The best grades of sucker-rods contain alloy elements and are quenched and tempered to give a sorbitic fine grain structure. The heat treatment of such long thin members as sucker-rods is a real metallurgical achievement.

BOURRAGE DE GRAVIER DES CHEMISES

En Californie, l'intérêt des autres opérateurs s'est porté sur les résultats obtenus par la Texas Co. par l'emploi de chemises à bourrage de gravier. Dans certains cas les puits ainsi équipés ont fait preuve d'une productivité nettement supérieure à celle des puits voisins, mais la principale raison visée par cette méthode a été d'éviter les ennuis dûs au sable. La sélection du calibre de gravier est basée sur la supposition qu'il est désirable de conserver tout le sable dans le gisement sauf la fine fleur de sable qui se pompe facilement avec le pétrole. On fait emploi de gravier de rivière criblé, en général du calibre obtenu au tamis de ¼ à ⅜ de pouce de maille. D'ordinaire on pose dans le puits une chemise de 6⅝ pouces, ce puits ayant été alésé jusqu à environ un diamétre de 16 pouces à travers la zone productrice. L'espace autour de la chemise est bourré de gravier. Pour cela on ajoute du gravier au liquide de forage de la consistance convenable, en faisant descendre ce liquide par pompage à l'extérieur du tuyau de forage où la chemise est suspendue. La boue revient à la surface par l'intérieur du tuyau de forage, tandis que le gravier est tamisé au fond de la chemise. Plus tard on sépare la boue du gravier par lavage à l'eau. Les chemises employées sont doublées de manchons en ciment qui forcent la boue porteuse de gravier à passer autour du fond de la chemise avant de revenir à la surface. Après avoir mis le gravier, on sort le ciment par forage afin d'exposer les perforations de la chemise. On signale que ce type perfectionné d'aménagement de puits a réduit la durée de nettoyage à un sixième de celui qui s'impose dans le cas d'aménagement du type standard.

METAUX ET ALLIAGES

Les progrès enregistrés dans l'emploi des métaux en matiére de production ne sont pas sensationnels. Toutefois chaque année voit une diffusion plus grande de l'emploi des aciers spéciaux pour les outils et le matériel de production. Il est maintenant courant de faire usage d'aciers spéciaux à bas pourcentage pour les tiges aspiratrices, les chaînes et crochets, les corps d'outils et de vannes, les pistons, arbres et tiges de poli et les goujons et fraises sur outils de rotatif. En fait les emplois en production des aciers spéciaux sont ceux qui deviennent en ce moment courants pour toutes les machines.

Les aciers employés en production contiennent une teneur relativement faible d'élément d'alliage, et l'élément spécial est ajouté surtout dans le but de gagner en ténacité plutôt qu'en résistance à la corrosion. Le tableau qui suit indique les types d'aciers qui sont utilisés mais ne donne pas la liste de tous les aciers qui sont utiles.

Ces aciers sont employés sous la forme qui a subi la trempe suivie de revenu, mais les aciers à faible teneur de carbone sont en général carburés et cémentés. L'emploi des aciers spéciaux a permis de faire des outils et du matériel de forage plus robustes et plus compacts.

On emploie ces mêmes éléments dans la fabrication des fontes spéciales pour des usages tels que piéces de moteur, pistons, tambours de frein et disques d'embrayage.

Les meilleures qualités de tiges aspirantes contiennent des éléments d'alliage et sont soumises à la trempe suivie de revenu pour obtenir une texture sorbitique à grain fin. Le traitement thermique de pièces aussi longues et minces que les tiges aspirantes est un réel exploit métallurique.

METALES Y ALEACIONES

Las innovaciones en el empleo de metales en la producción no son espectaculares. Sin embargo, año tras año, se observa un creciente empleo de aleaciones de acero para las herramientas y equipos que se utilizan en la producción. Es ahora práctica generalizada utilizar aleaciones de acero de bajo porcentaje en varillas de aspiración, cadenas, ganchos, herramientas y cuerpos de válvula, émbolos, árboles, vástagos pulidos, pasadores y cortadores en los equipos rotativos. En realidad, el empleo de aceros especiales en la producción se presenta en aplicaciones que se están haciendo ahora comunes para toda maquinaria.

Los aceros que se emplean en la producción contienen una proporción comparativamente pequeña de elemento de aleación, y el elemento especial se agrega principalmente con el objeto de aumentar la fuerza, más bien que la resistencia a la corrosión. La tabla siguiente indica los tipos de aceros que se emplean, pero no comprende todos los aceros que pueden también utilizarse en la producción.

Estos aceros se emplean en condición templada, pero los aceros de bajo contenido de carbón se se tratan con carbono y someten a cementación la horno. El empleo de aleaciones de acero ha permitido fabricar herramientas de perforación y equipos más firmes y compactos.

Estos mismos elementos se emplean en la fabricación de aleaciones de hierro fundidas, para piezas como partes de motor, émbolos, tambores de frenos y placas de embrague.

Las varillas de aspiración de mejor calidad contienen elementos de aleación que se someten a temple seguido por un tratamiento especial, para obtener una textura de grano fino de características especiales. El tratamiento térmico de las varillas de aspiración, que son piezas largas y angostas, es un verdadero triunfo metalúrgico.

se hace añadiendo la grava al líquido de perforación de adecuada consistencia, y bombeando el líquido hacia abajo, por la parte de afuera del tubo de perforación, del cual pende el forro. El barro o lodo regresa a la superficie por el interior del tubo de perforación, y la grava pasa hasta el fondo del forro. Más tarde, el lodo o barro se lava de la grava con agua. Los forros empleados llevan un revestimiento de cemento, que obliga al barro que lleva la grava, a pasar por el fondo del forro antes de regresar a la superficie. Después de la colocación de la grava, el revestimiento de cemento se perfora, para dejar expuestas las perforaciones del forro. Se dice que este adelantado método de completar pozos ha reducido el tiempo de limpieza a una sexta parte del que se consume ordinariamente por el método de terminación corriente.

STEELS USED IN PRODUCTION EQUIPMENT

Kind of Steel	Approximate analysis Percent					
	C.	Cr.	Ni.	Mo.	Va.	Mn.
Molybdenum chrome	0 3–0 4	0 6–0 9	0	0 2	0	0 6–0 7
Molybdenum nickel	0 1–0 4	0	1 5–1 8	0 25	0	0 5–0 6
Chrome nickel	0 1–0 5	0 6–0 8	1 2	0	0	0 3–0 9
Vanadium chrome	0 1–0 4	0 8–1 1		0	0 15–0 18	0 3–0 9
Manganese	0 1–0 5	0	0	0	0	0 9–1 2

ACIERS EMPLOYES EN MATERIAL DE PRODUCTION

Type d'acier	Analyse approximative—Pourcentages					
	C.	Cr.	Ni.	Mo.	Va.	Mn.
Chrome-molybdène	0,3-0,4	0,6-0,9	0	0,12	0	0,6-0,7
Nickel-Molybdène	0,1-0,4	0	1,5-1,8	0,25	0	0,5-0,6
Nickel-chrome	0,1-0,5	0,6-0,8	1,2	0	0	0,3-0,9
Chrome-vanadium	0,1-0,4	0,8-1,1		0	0,15-0,18	0,3-0,9
Manganèse	0,1-0,5	0	0	0	0	0,9-1,2

ACEROS EMPLEADOS EN LOS EQUIPOS DE PRODUCCION

Clase de acero:	Análisis aproximado porcentaje					
	C	Cr.	Ni.	Mo.	Va.	Mn.
Al cromo y molibdeno	0,3 a 0,4	0,6 a 0,9	0	0,12	0	0,6 a 0,7
Al molibdeno y níquel	0,1 a 0,4	0	1,5 a 1,8	0,25	0	0,5 a 0,6
Al cromo y níquel	0,1 a 0,5	0,6 a 0,8	1,2	0	0	0,3 a 0,9
Al cromo y vanadio	0,1 a 0,4	0,8 a 1,1		0	0,15 a 0.18	0,3 a 0,9
Al manganeso	0,1 a 0,5	0	0	0	0	0,9 a 1,2

SS-40 + Red-Hed (API-3)

SS-124 (API-4)

SS-40 Hyper (API-3)

SS-124 + Red-Hed (API-4)

SS-124 Three Bar Hyper (API-4)

SS-124 Hyper de tres barras (API-4)

SS-124 Hyper à trois barres (API-4)

SS-124 Two Bar Hyper (API-4)

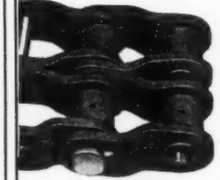
SS-124 Hyper de dos barras (API-4)

SS-124 Hyper à deux barres (API-4)

SS-3125 Hyper, Single

SS-3125 Hyper, Sencilla

SS-3125 Hyper, Simple



SS-3125 Hyper, Double

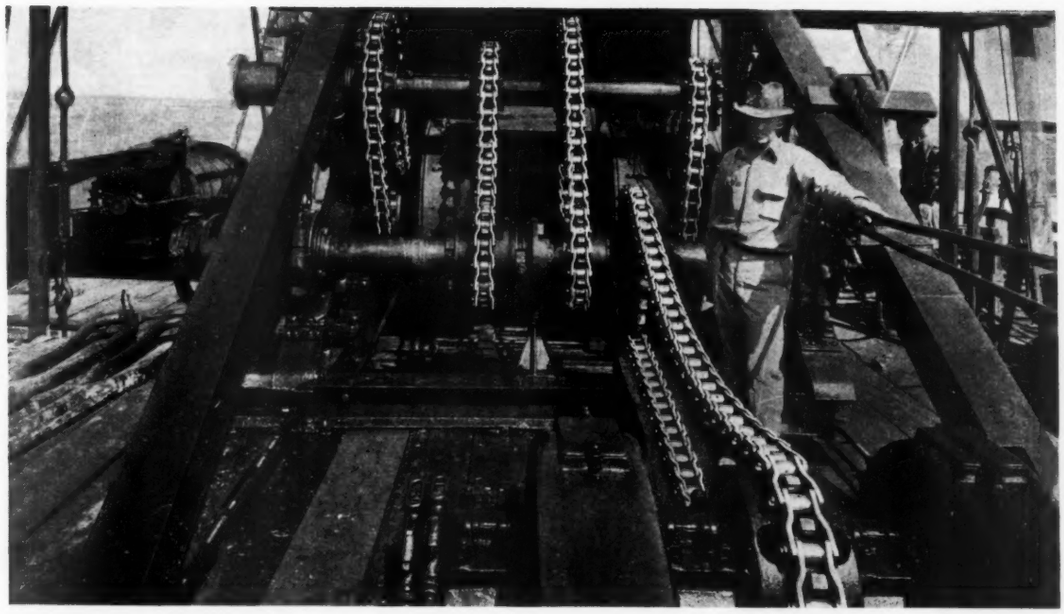
SS-3125 Hyper, Doble

SS-3125 Hyper, Double

Silverlink Finished Steel Roller Chain for drilling, servicing and pumping equipment.

Cadena Silverlink de rodillos de acero acabado, para equipo de perforación, de servicio y de bomba.

Chaîne à rouleaux Silverlink en acier fini, pour matériel de forage, d'entretien et de pompage.



A Chain for Every Drilling Service

● Link-Belt Company pioneered in the art of chain making and are today the leading manufacturers of chains for power transmission and conveying purposes. Link-Belt chains, as illustrated, are extensively used in the oil industry throughout the world and the "SS" class chains, built to A.P.I. dimensions, provide a suitable chain for every drilling service regardless of depth or type of formation.

This >——< double arrow trademark identifies genuine Link-Belt chains. Specifications are as follows:

Pitch Inches	Approx. Links in 10 Ft	Link-Belt Chain Number and Ultimate Strength, Pounds	Net Weight Per Foot, Pounds	Packed for Export Per 100 Feet: Approx. Gross Wt., Lbs.	Packed for Export Per 100 Feet: Approx. Cu. Feet.
3.075	39	SS-40+Red-Hed (API-3), 48,000	6.8	765	9
4.063	30	SS-124 (API-4), 60,000	14.6	1,610	18
4.063	30	SS-124+Red-Hed (API-4), 112,000	15.6	1,710	18
3.075	39	SS-40 Hyper (API-3), 75,000	8.3	915	9
4.063	30	SS-124 Two Bar Hyper (API-4), 130,000	16.1	1,760	18
4.063	30	SS-124 Three Bar Hyper (API-4), 170,000	16.3	1,780	18
3.125	39	SS-3125 Hyper, Single, 115,000	12.7	1,450	15
3.125	39	SS-3125 Hyper, Double, 230,000	24.0	2,700	30
3.125	39	SS-3125 Hyper, Triple, 345,000	36.0	4,000	44

EXPORT OFFICES: 2680 Woolworth Bldg., New York, N. Y. Cable and Radio Address: "LINKBELT-NEW YORK"

Una Cadena para cada Servicio de perforación

● La Link-Belt Company fué una de las primeras en perfeccionar el arte de hacer cadenas y hoy es la fábrica más grande de cadenas para transmisión de fuerza y trabajos de transporte. Las cadenas Link-Belt aquí ilustradas, se usan mucho en la industria petrolera, en todas partes del mundo. Las cadenas de la clase "SS", construídas según los patrones del A.P.I., proveen un tipo idealmente adecuado a todo servicio de perforación, sin relación de profundidad o tipo de formación del pozo petrolífero.

La marca comercial de doble flecha >——< sirve de identificación a las legítimas cadenas Link-Belt. Las especificaciones son las siguientes:

Paso, en pulgs.	No. aprox. de eslabones por cada 10 piés	No. de cadena Link-Belt y fuerza final en libras	Peso neto por pié en libras	Embalada para la exportación cada 100 piés: Peso bruto aproximado en libras	Embalada para la exportación cada 100 piés: Dimensión cúbica aprox.
3.075	39	SS-40+Red-Hed (API-3), 48,000	6.8	765	9
4.063	30	SS-124 (API-4), 60,000	14.6	1,610	18
4.063	30	SS-124+Red-Hed (API-4), 112,000	15.6	1,710	18
3.075	39	SS-40 Hyper (API-3), 75,000	8.3	915	9
4.063	30	SS-124 Hyper de dos barras, (API-4), 130,000	16.1	1,700	18
4.063	30	SS-124 Hyper de tres barras, (API-4), 170,000	16.3	1,780	18
3.125	39	SS-3125 Hyper, Sencilla, 115,000	12.7	1,450	15
3.125	39	SS-3125 Hyper, Doble, 230,000	24.0	2,700	30
3.125	39	SS-3125 Hyper, Triple, 345,000	36.0	4,000	44

DEPARTAMENTO DE EXPORTACION: 2680 Woolworth Bldg., Nueva York, N. Y., E. U. A. Dirección por radio y telégrafo: "LINKBELT-NEW YORK"

Une Chaîne pour Chaque Service de Forage

● La Link-Belt Company a été un pionnier dans l'art de la fabrication des chaînes, et est à l'heure actuelle en tête des fabricants de chaînes destinées à la transmission de la force motrice ou à l'entraînement des transporteurs. Les chaînes Link-Belt, telles celles de la gravure ci-dessus, sont d'un emploi très répandu dans l'industrie du pétrole dans le monde entier, et les chaînes de la classe "SS", construites d'après les cotes A.P.I., permettent de sélectionner la chaîne appropriée à chaque service de forage, quel que soit le type ou la profondeur du gisement exploité.

La marque de fabrique à double flèche >——<, identifie les chaînes Link-Belt véritables. En voici les caractéristiques:

Pas en pouces	Nbre approx. de maillons par 10 pieds	Numéro de chaîne et charge de rupture Link-Belt, en livres	Poids net par pied, en livres	Emballées pour l'exportation par 100 pieds: Poids brut approx. en livres	Emballées pour l'exportation par 100 pieds: Pieds cubes approx.
3.075	39	SS-40+Red-Hed (API-3), 48,000	6.8	765	9
4.063	30	SS-124 (API-4), 60,000	14.6	1,610	18
4.063	30	SS-124+Red-Hed (API-4), 112,000	15.6	1,710	18
3.075	39	SS-40 Hyper (API-3), 75,000	8.3	915	9
4.063	30	SS-124 Hyper à deux barres, (API-4), 130,000	16.1	1,760	18
4.063	30	SS-124 Hyper à trois barres, (API-4), 170,000	16.3	1,780	18
3.125	39	SS-3125 Hyper, Simple, 115,000	12.7	1,450	15
3.125	39	SS-3125 Hyper, Double, 230,000	24.0	2,700	30
3.125	39	SS-3125 Hyper, Triple, 345,000	36.0	4,000	44

BUREAUX D'EXPORTATION: 2680 Woolworth Bldg., New York, N. Y. Adresse télégraphique: "LINKBELT-NEW YORK"

7243

LINK-BELT COMPANY

INDIANAPOLIS CHICAGO PHILADELPHIA NEW YORK LOS ANGELES TULSA HOUSTON DALLAS

LINK-BELT

ROTARY DRILLING CHAINS

MIDCO

HARD FORMATION BITS

. . . Are pioneers of all Bits of similar construction. They have helped to evolutionize deep drilling in both hard and soft formation the world over—a result of outstanding performance. They get the job done *faster* and at *less cost*.

End view of Solid Type Bit illustrating blade construction

MADE IN TWO TYPES . . . the solid type designed for use in fields where a redressing shop is accessible; the Demountable Head Type designed for use in fields where difficulties are encountered in transportation.

HIGHEST GRADE ALLOY STEEL . . . Steel castings and billets used in the manufacture of Midco Bits are of the best grade alloy steel and heat-treated in electrolled furnaces.

BLADES DIAMOND SUB SET . . . And faced with Tungsten Carbide unless otherwise specified.

CIRCULATION HOLES . . . have been provided and located so that they will give maximum of washing action over cutting blades.

DEMOUNTABLE HEAD BIT SHANKS . . . are constructed so that ample mud clearance is given at all times. No ball-up of bit and bit shank assembly.

PREVUS EN DEUX TYPES . . . le type massif prévu pour emploi dans les champs où l'on est à portée d'un atelier réaffûtage; le type à tête démontable pour emploi dans les champs où l'on se heurte à des difficultés de transport.

ACIER SPECIAL DE LA PLUS HAUTE QUALITE . . . Les pièces coulées et billettes en acier employées dans la fabrication des trépans Midco sont en acier spécial de la plus haute qualité et traité thermiquement dans des fours électriques spéciaux.

LAMES SOUS-GARNIES DE DIAMANT . . . Et plaquées de carbure de tungstène à moins de spécification contraire.

TROUS DE CIRCULATION . . . qui ont été prévus et placés de façon à assurer une action de lavage maximum sur les lames coupantes.

TIGES DE TREPAN A TETE DEMONTABLE . . . de construction telle qu'il y a à tout moment une place libre suffisante pour les boues. Pas d'ensemble de rotule de trépan et tige de trépan.

SE OFRECE EN DOS TIPOS . . . el tipo macizo, para empleo en campos que cuentan con taller de afilar; y el tipo de cabeza desmontable, para empleo en aquellos campos petrolíferos en que se presentan dificultades de transporte.

ALEACION DE ACERO DE LA MAS ALTA CALIDAD . . . Todas las piezas de acero fundido que se utilizan en la fabricación de las barrenas Midco son de la más fina aleación especial, tratada térmicamente en hornos eléctricos.

LAMINAS CON CAPA INFERIOR DIAMANTINA . . . y con revestimiento exterior de carburo de tungsteno, a menos que se especifique lo contrario.

ORIFICIOS DE CIRCULACION . . . están colocados de tal manera que aseguran una máxima acción de limpieza sobre las láminas cortantes.

VASTAGOS DE BARRENA DE CABEZA DESMONTABLE . . . están construídos de tal modo que en todo momento hay suficiente espacio para el lodo o barro. No hay grupo de rótula de barrena y vástago de barrena.

1—Midco Bit Shank for Demountable Head Bit.

3—Side view of Solid Type Bit, showing location of circulating holes.

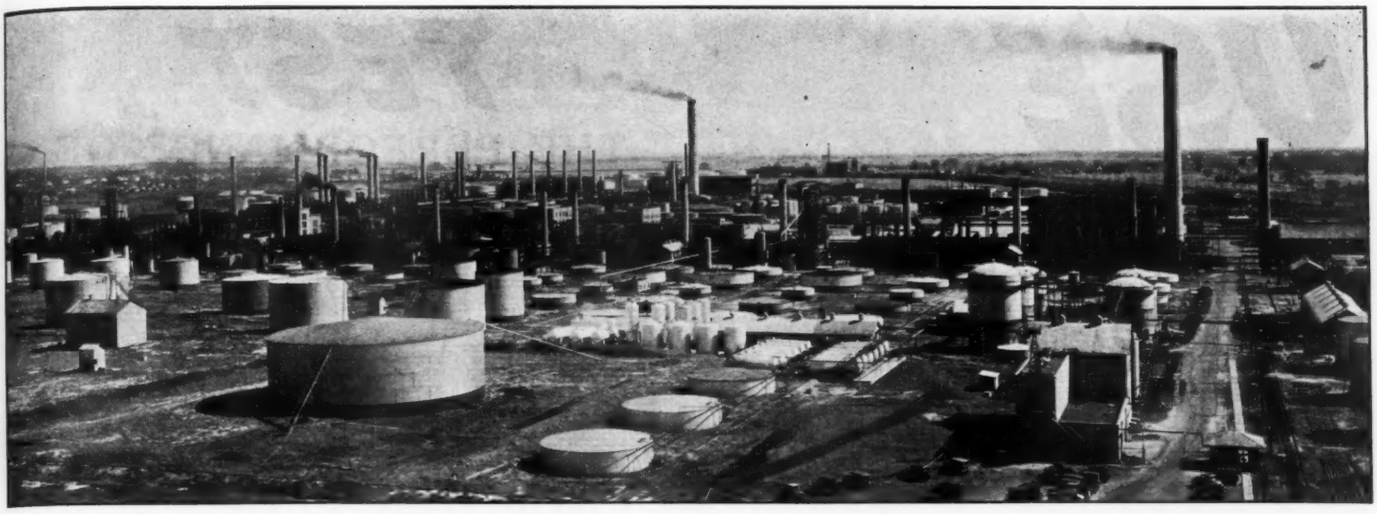
2—Midco Demountable Type Bit. Notice off-set blade construction.

4—The Midco Bit Breaker is made to fit any size bit or table.

MIDCO TOOL & SUPPLY CO.

1006 S.E. 29TH ST. OKLAHOMA CITY, OKLA., U. S. A.

"IF IT'S MIDCO—IT'S MODERN"



Typical large oil refining plant *Installation typique d'une grande raffinerie de petrole* *Tipica refineria grande de petroleo*

Petroleum Refining — Raffinage de Petrole

Refinacion del Petroleo

Technological changes in oil refining equipment and processes are developing at such a rapid rate that any attempt to place a severe interpretation on the term "modern" refinery leads to the conclusion that not one truly modern plant exists. Every refinery, not matter how recently built or how well its equipment is maintained, contains some unit or follows some method of processing which refinery technologists could declare obsolete in favor of something that had just been developed.

Of course, any one who assumes such an extreme position is considering modern oil refining as a manufacturing procedure which can be quickly molded to suit any and all conditions. Unfortunately, to do this it would often mean scrapping equipment that had not been paid out or installing high-cost equipment that is not perfected. This interpretation is unreasonable.

Instead, progress in the art must weigh the economics of the changes and the "moderness" of any plant must be considered as something relative, and measured by the status of plants generally.

Considered in this light, there are many modern refineries, each in its own way. Yet, refiners generally have not installed equipment just because it was new also they have made long analyses of every important proposed change in their manufacturing routine. This has been necessary since refining has become relatively complicated and the processing routine has been made to be continuous. It involves processing large volumes of material. For these reasons, any substantial, proposed change in any phase of the routine has first been weighed carefully.

YEARS OF RESEARCH

Back of each important change or prospective change there are also months and sometimes years of research followed by a long period of semi-commercial operation.

(Continued on Page 229)

Les progrès technologiques en matériel et en procédés de raffinage de pétrole se succèdent si rapidement que toute tentative de donner une interprétation fixe au terme raffinerie "moderne" conduit à la conclusion qu'il n'existe pas de fabrique vraiment moderne. Toute raffinerie, quelque récente qu'elle soit et même si le matériel en est souvent modernisé, a toujours quelque élément ou quelque méthode de traitement que les technologistes de raffinerie pourraient qualifier de suranné par rapport aux progrès de la dernière heure.

Il va de soi que toute personne qui prend une attitude aussi extrême considère le raffinage moderne du pétrole comme un processus de fabrication apte à être rapidement adapté aux conditions les plus diverses. Malheureusement, ceci impliquerait le plus souvent qu'il faudrait condamner du matériel non encore amorti ou faire l'installation de matériel coûteux appelé à être encore perfectionné. Il est clair que cette interprétation est irrationnelle.

Au contraire, il faut juger les progrès de la technique par leurs aspects économiques, et le caractère "moderne" de toute raffinerie doit être considéré comme un facteur relatif dont la mesure est donnée par comparaison avec les autres raffineries.

Sur cette base, on voit qu'il y a de nombreuses raffineries modernes, chacune à sa manière. Et pourtant les raffineurs n'ont pas en général fait l'installation de matériel pour la seule raison qu'il était nouveau. De même ils ont fait de multiples analyses avant d'adopter tel ou tel changement important proposé dans leur processus de fabrication. Il a fallu en venir là parce que le raffinage est devenu relativement compliqué et que le processus en a été fait continu. En outre, il s'agit du traitement de grandes quantités. C'est pour ces raisons qu'on a toujours soin de bien peser tout changement d'importance envisagé pour telle phase du processus.

DES ANNEES DE RECHERCHES

A la base de chaque progrès décisif ou progrès envisagé, il y a aussi des mois et parfois des années de recherches suivies d'une longue période d'application semi-commerciale.

Les méthodes qui impliquent des modifications

(Continué sur Page 229)

Los cambios tecnológicos en equipo de refinería y en procedimientos de petróleo se están desarrollando con tanta rapidez que todo esfuerzo por dar una interpretación absoluta a la denominación de "refinería moderna" conduce a la conclusión de que no existe ninguna instalación verdaderamente moderna. Toda refinería, por muy recientemente que se haya construído o por bien que se mantenga su equipo, contiene algún elemento o sigue algún método de explotación que los tecnólogos de refinería podrían calificar de anticuado, a favor de álgo que acaba de perfeccionarse.

Por supuesto, cualquiera que asuma semejante posición extrema, está considerando a la moderna refinería de petróleo como un procedimiento manufacturero, que puede ser rápidamente amoldado a responder a todas las condiciones imaginables. Por desgracia, hacer ésto significaría, a menudo, desprenderse de equipo, que no ha devuelto todavía su precio de compra, o instalar un equipo muy caro, que todavía está sin perfeccionarse. Esta interpretación no es racional.

En lugar de todo ésto, en progreso en el arte debe medirse por los cambios económicos que introduce y por su parte, la modernidad de toda instalación, debe considerarse como algo relativo y avaluarse por el estado general de las demás instalaciones.

Desde este punto de vista, hay muchas refinerías modernas, cada una en un sentido peculiar. Sin embargo, los refinadores en general no han instalado equipo nada más era nuevo y han hecho también detenidos estudios de cada importante cambio propuesto en su rutina manufacturera. Esto ha sido necesario, a causa de que la refinería se ha hecho comparativamente complicada y el trabajo general de conversión ha llegado a ser actividad contínua. El trabajo comprende ahora la conversión de una gran cantidad de material. Por estas razones, cualquier cambio de cierta importancia, que se proponga, en cualquiera fase del trabajo rutinario, tiene que ser primeramente estudiado con mucho cuidado.

ANOS DE ESTUDIO

Detrás de cada importante cambio realizado o cambio en perspectiva hay también muchos meses, y a veces, años de estudios seguidos por largos períodos de operación semicomercial.

Los procedimientos que implican importantes revisiones en la rutina normal de la refinería o

(Continué en Página 229)

For GREATER RESULTS—GREATER ECONOMY

USE SIEVERS REAMERS

TO STABILIZE THE BIT—INSURE STRAIGHT HOLE—REAM TO FULL GAUGE—

THOUSANDS of runs, under every possible field condition, have proved beyond question that the barrel-shaped cutters of Sievers Reamers—set at the "Sievers Angle"—provide the safest and most efficient reaming action ever developed—a reaming action that produces round, *full-gauge, properly conditioned hole* in which casing can safely be run without difficulty or loss of time. Experienced operators everywhere also depend upon Sievers Reamers to STABILIZE the bit, thus insuring *straight hole, minimum danger* of *twist-off*, and *increased cutting speed* of the bit.

Sievers Reamers offer you a choice of reamer bodies in *three cutter* or *six cutter* design, made in one-piece of either *forged* or *cast steel*, as desired. Cutters are available in three styles to meet your specific reaming and stabilizing problems.

6-Cutter Sievers Reamer

Aléseur Sievers à 6 fraises

Escariador Sievers de 6 fresas.

Standard Disc-Type Cutter, for average reaming

Fraise standard du type disque, pour alésage courant

Fresa normal de disco para trabajo corriente de escariar.

Knurled Roller Cutter, for bit stabilization only

Fraise à roule-au molleté, pour stabilisation de trépan seulement

Fresa con rodillo estriado, para la estabilización de la barrena solamente.

Spirally Fluted Cutter, for hard rock reaming only

Fraise à cannelures en spirale, pour alésage en rocs durs seulement

Fresa con ranura en espiral, para escariar en roca dura solamente.

3-Cutter Sievers Reamer

Aléseur Sievers à 3 fraises

Escariador Sievers de 3 fresas.

Des milliers d'essais, dans toutes les conditions possibles au chantier, ont prouvé sans conteste que les fraises en forme de tube des aléseurs Sievers—disposées sous "l'angle Sievers"—assurent l'action d'alésage la plus sûre et la plus efficace à ce pour—une action qui produit un *trou* rond, *à la cote et bien conditionné*, où l'on peut descendre le revêtement en toute sécurité, sans ennuis ou pertes de temps. Partout les exploitants avisés comptent aussi sur les aléseurs Sievers pour STABILISER le trépan, étant ainsi sûrs d'obtenir des *trous droits*, avec un *minimum de danger de faussage*, et une *vitesse de pénétration plus grande* du trépan.

Les aléseurs Sievers vous offrent un choix de corps d'aléseurs en types à *trois fraises* ou *six fraises*, d'une seule pièce soit en *acier forgé*, soit en *acier coulé*, au choix. Les fraises sont prévues en trois types pour répondre aux données exactes de vos problèmes d'alésage et de stabilisation.

Millares de trabajos, bajo todas las condiciones imaginables, que se presentan en la práctica, en los campos petroliferos, han demostrado, sin lugar a la menor duda, de las fresas en forma de tubo de los escariadores Sievers—dispuestas al "ángulo Sievers—aseguran la más segura y eficaz acción escariadora que existe hoy día—una acción escariadora que produce un agujero redondo, *de diámetro completo y muy bien acondicionado, en el* cual puede fácilmente introducirse el revestimiento, sin dificultad ni pérdida de tiempo. Los petroleros de experiencia, en todas partes, dependen también de los escariadores Sievers para ESTABILIZAR la barrena o broca, asegurando así un *agujero recto, mínimo peligro de desviación y mayor velocidad de avance de la barrena.*

Los escariadores Sievers se ofrecen con elección a cuerpos de escariador en tipos de *tres fresas* o de *seis fresas*, hechos de una sola pieza de acero forjado o de acero fundido, como se pida. Las mismas fresas se ofrecen en tres estilos, para satisfacer sus requisitos particulares en materia de escariar y estabilización.

TEST THE PERFORMANCE OF SECURITY VALVES

IN YOUR OWN SLUSH PUMPS

The sealing efficiency and long life of Security Slush Pump Valves has been demonstrated by three years of successful use in severe field service. The chief causes of slush pump valve failure are abrasive wear on the sealing surface and impact of the valve on the seat. The Security Valve eliminates both of these detrimental features. An impact washer, backed by the strong bridge across the bottom of the seat, takes the pounding action as the valve closes; and positive sealing action is effected by the concave curved surface of the rubber insert which seals around the curved surface of the valve seat. As the impact washer wears in service, and the valve seats lower into the valve seat, the curved surface of the rubber insert slides downward into the curved valve seat, and the rubber is not subjected to any tearing action.

Try a set of Security Valves in your own Slush Pumps. They will bring you savings and results you have never had from other valves.

Security Slush Pump Valve On Seat

Vanne de pompe à boues Security sur son siège

Válvula de bomba de lodo en su asiento.

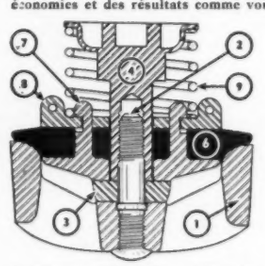
Valve Seat, showing curved sealing surface and strong bridge

Siège de vanne, montrant la surface d'hermétisation à courbure et le fort pont

Asiento de válvula, mostrando la superficie curva de cierre hermético y firme puente.

L'étanchéité parfaite et la durabilité des vannes de pompe à boues Security ont été prouvées par 3 ans d'emploi satisfaisant en service dur au chantier. Les principales causes de pannes de vannes de pompe à boues sont dues à l'usure abrasive sur la surface d'étanchéification et aux chocs de la soupape sur son siège. La vanne Security élimine *l'une et l'autre* de ces causes fâcheuses. Une rondelle de choc, soutenue par le fort pont en travers du fond du siège, absorbe l'effet de choc à la fermeture de la vanne, et une action d'hermétisation positive est réalisée par la surface à courbe concave du caoutchouc rapporté qui hermétise tout autour de la surface courbe du siège de vanne. A mesure que la rondelle de choc s'use en service, et que les sièges de soupape descendent dans le siège de vanne, la surface courbée du caoutchouc rapporté glisse vers le bas dans le siège de vanne à courbure, et le caoutchouc ne risque ainsi pas de se déchirer.

Faites donc l'essai d'un jeu de vannes Security dans vos propres pompes à boues. Vous en tirerez des économies et des résultats comme vous n'en avez jamais encore eus avec d'autres vannes.



Details of construction of Security Slush Pump Valve

Détails de construction de la vanne de pompe à boues Security

Detalles de construcción de la válvula Security para bomba de lodo.

La hermeticidad perfecta y la gran duración de las válvulas de bomba de lodo Security han sido demonstradas por tres años de empleo satisfactorio en exigentes servicios de campos de petróleo. Las causes principales de la falla de las válvulas de bombas de lodo se deben al desgaste, por rozamiento, de la superficie de cierre y a los choques de la válvula sobre su asiento. La válvula Security elimina estas dos causas de falla. Una arandela de choque, sostenida por el firme puente a través del fondo del asiento, absorbe el efecto del choque, durante el cierre de la válvula, y se realiza una acción de cierre hermético por la superficie curva cóncava de la inserción de caucho, que ajusta perfectamente alrededor de la superficie curva del asiento de la válvula. A medida que la arandela de choque se va desgastando en el servicio, y la válvula queda más baja en su asiento, la superficie curva de la inserción de caucho se desliza hacia abajo en el asiento curvo de la válvula, y la pieza de caucho no queda aquí sujeta a ninguna acción destructora.

Sírvase ensayar un juego de válvulas Security en sus propias bombas de lodo, y verá que la aportarán ahorros y resultados mucho mejores que los que haya obtenido de válvulvas de otras marcas.

SECURITY ENGINEERING CO.

108 West Whittier Blvd. Whittier, California

BAKERSFIELD • VENTURA • KETTLEMAN HILLS

Export Security Engineering Co., 420 Lexington Ave., New York City

Western Equipment

WESTERN "WIZARD" FRICTION TYPE PUMPING UNIT

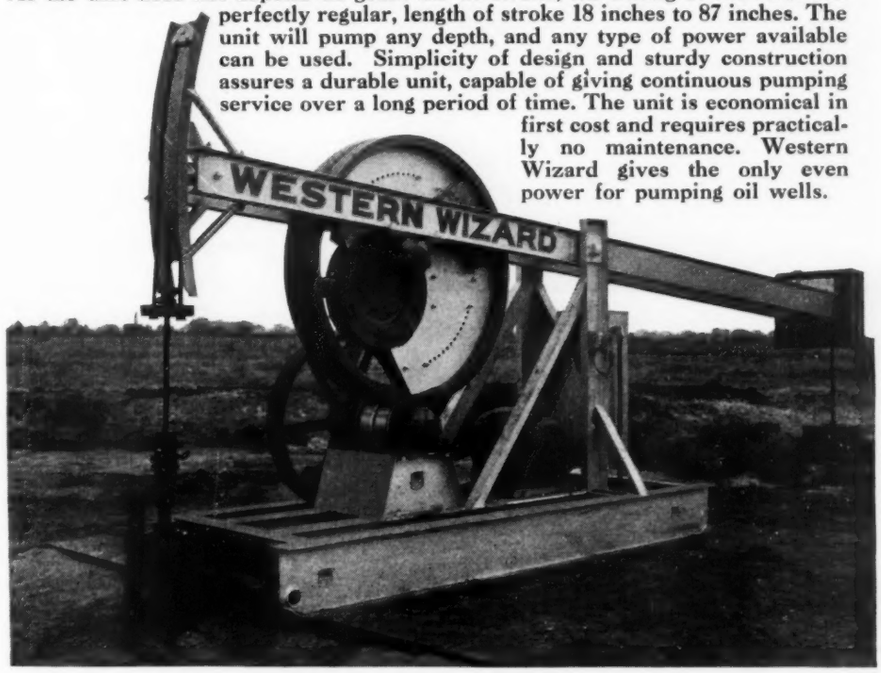
GROUPE DE POMPAGE TYPE A FRICTION "WIZARD" WESTERN

Le groupe de pompage Western fonctionne au moyen d'une roue à friction, ce qui supprime les engrenages réducteurs qui sont parfois une source de pannes de tiges aspiratrices par suite de la trépidation. Comme le groupe ne dépend pas d'engrenages pour sa course, la durée de la course est absolument régulière, longueur de course 18 à 87 pouces. Ce groupe peut pomper à toute profondeur et employer la force motrice qu'on voudra. La simplicité et la robustesse de construction en font un groupe durable, capable d'assurer un service de pompage continu pendant une longue période de temps. Economique à l'achat, il n'a pour ainsi dire pas d'entretien. Le Wizard Western est seul à donner une force égale pour le pompage des puits de pétrole.

GRUPO DE BOMBA "WIZARD" WESTERN, TIPO DE FRICCION

El grupo de bomba Western funciona mediante una rueda de fricción, lo que suprime los engranajes de reducción, que son, a veces, una fuente de irregularidades para la varilla de aspiración, debido al choque. Como la bomba no depende de engranajes, para su carrera, la duración de la carrera es perfectamente regular, quedando comprendida entre 18 y 87 pulgadas. Este grupo puede aplicarse al bombeo de cualquier profundidad y para su funcionamiento puede emplearse cualquier tipo de fuerza motríz a mano. La sencillez y la firmeza de la construcción le imparten gran duración y la seguridad de un contínuo servicio de bombeo durante un largo período de tiempo. Este grupo es económico en precio inicial y en conservación. La bomba Wizard Western es la única que da una fuerza uniforme para el bombeo de pozos de petróleo.

The Western Pumping Unit operates from a friction wheel, thus eliminating reduction gears, which at times are a source of sucker rod trouble due to shock. As the unit does not depend on gears for its stroke, the timing of the stroke is perfectly regular, length of stroke 18 inches to 87 inches. The unit will pump any depth, and any type of power available can be used. Simplicity of design and sturdy construction assures a durable unit, capable of giving continuous pumping service over a long period of time. The unit is economical in first cost and requires practically no maintenance. Western Wizard gives the only even power for pumping oil wells.

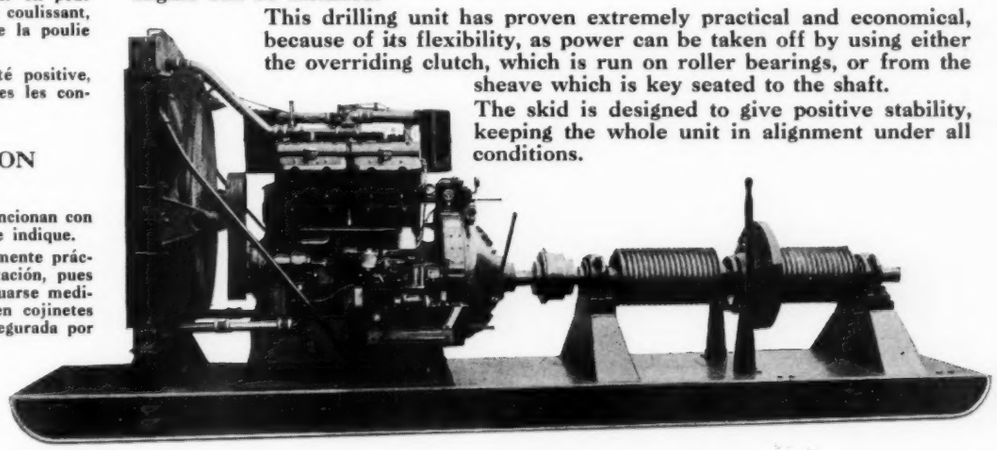


WESTERN DRILLING UNITS

Capable of drilling wells to 8500 feet. Practically any type or size of power engine can be installed.

This drilling unit has proven extremely practical and economical, because of its flexibility, as power can be taken off by using either the overriding clutch, which is run on roller bearings, or from the sheave which is key seated to the shaft.

The skid is designed to give positive stability, keeping the whole unit in alignment under all conditions.



GROUPES DE FORAGE WESTERN

Capables de forer des puits jusqu'à 8500 pieds. On peut installer à peu près tout type ou grandeur de groupe moteur.

Ce groupe de forage s'est montré des plus pratiques et économiques grâce à sa grande souplesse, car on peut prendre la force soit au moyen de l'embrayage coulissant, qui fonctionne sur paliers à rouleaux, soit de la poulie qui est clavetée sur l'arbre.

Le patin est conçu pour assurer une stabilité positive, maintenant le groupe entier aligné dans toutes les conditions.

GRUPOS DE PERFORACION WESTERN

Pueden perforar pozos hasta de 8.500 piés. Funcionan con casi cualquier tipo o tamaño de motor que se indique.

Este grupo de perforación ha resultado sumamente práctico y económico, debido a su notable adaptación, pues la aplicación de la fuerza motríz puede efectuarse mediante su embrague deslizante, que funciona en cojinetes de rodillos, o mediante la polea, que está asegurada por cuña en el árbol.

El patin, por su especial construcción, asegura positiva estabilidad, manteniendo el grupo completo en perfecta alienación bajo todas las condiciones que se presenten.

WESTERN OIL FIELD EQUIPMENT

Steel Derricks
Steel Fronts
Casing Pulling Machines
Pumping Units

Rig Irons
Bull Wheels—Calf Wheels—Band Wheels
Mast Heads—Crown Blocks
Counter Shafts—Pulleys

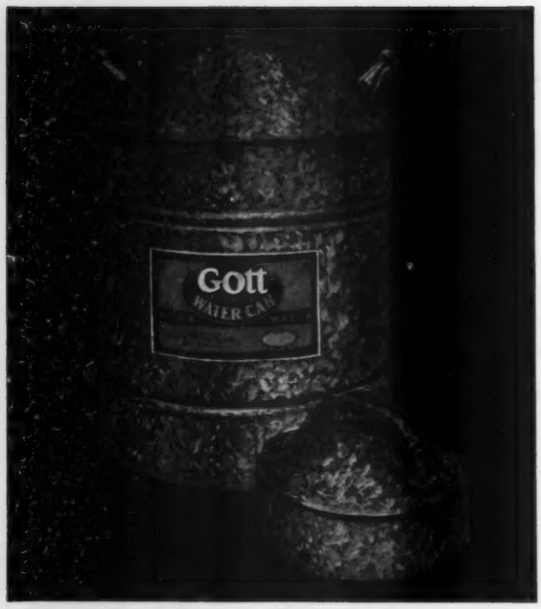
Structural Steel
Castings and Plate Work
Substructures
All Types of Sheaves

Core Drilling Machines
Counterbalances
Boiler Units for Drilling and Pumping
Ball Swivel Wrenches

See Composite Catalog 1938

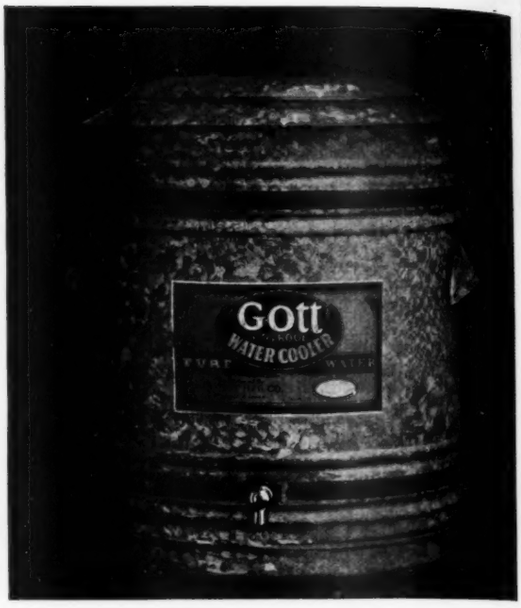
WESTERN IRON & FOUNDRY CO.

WICHITA, KANSAS, U. S. A.



GOTKOOL Water Cans and Coolers

Known throughout the Oil Industry, GOTKOOL Water Cans & Coolers are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting, easily removable tops. Extra large top on Water Cooler, also equipped with handy non-leaking faucet. Your Supply Store can supply you today.



GOTKOOL WATER CANS
Come in 1½, 3, 5 and 10 gallon sizes

BIDONS D'EAU GOTKOOL
Prévus de capacités de 1½, 3, 5 et 10 gallons

CUBOS O BALDES DE AGUA KOTKOOL
En tamaños de 1½, 3, 5 y 10 galones

SEE PAGE 679 COMPOSITE CATALOG

VOIR PAGE 679 DU CATALOGUE COMBINAISON

Vea la página 679 del CATALOGO DE COMBINACION

GOTKOOL WATER COOLERS
Come in 3, 5, 8, 10 and 20 gallon sizes.

REFROIDISSEURS D'EAU GOTKOOL
Prévus de capacités de 3, 5, 8, 10 et 20 gallons

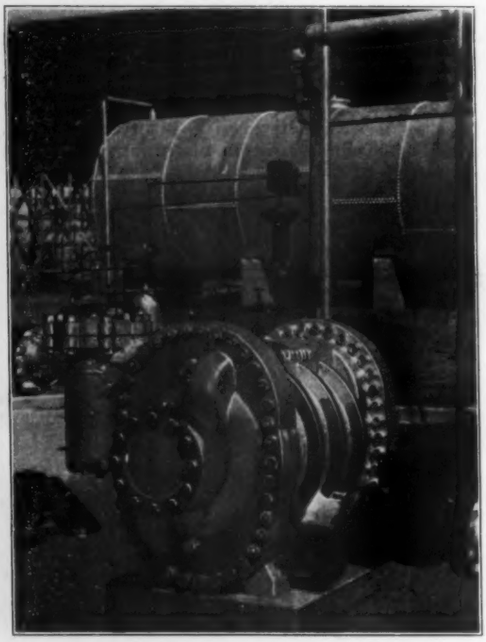
ENFRIADORES DE AGUA GOTKOOL
En tamaños de 3, 5, 8, 10 y 20 galonés.

Connus dans toute l'industrie du pétrole, les bidons et refroidisseurs d'eau GOTKOOL sont le moyen pratique de conserver fraîche de l'eau potable pendant de longues périodes, à l'abri des impuretés et toujours à portée de la main. Couvercles bien ajustés, faciles à enlever. Dessus extra-grand sur le refroidisseur d'eau, aussi muni d'un robinet anti-fuite pratique. Votre fournisseur habituel peut vous les fournir dès aujourd'hui.

Conocidos en toda la industria del petróleo, los baldes o cubos de agua y los enfriadores GOTKOOL representan el medio práctico de conservar fresca el agua potable durante largos períodos de tiempo, al abrigo de impurezas y siempre al fácil alcance de la mano. Tapas que ajustan muy bien y que pueden quitarse con facilidad. Tapas bien grandes en los enfriadores de agua y grifos a prueba de goteo muy prácticos. Sus abastecedores de costumbre pueden suministrarle estos artículos ahora mismo.

H. P. GOTT MFG. COMPANY, Winfield, Kansas, U.S.A.

Bassler Meters—For Highest Accuracy in Petroleum Measurement



Model 4EXE Bassler Thermostatic Meter; working pressure 500 lbs./sq. in., accurately recording 5,000,000 gallons per month, Butane-Propane 104 A.P.I. as of 60° F.

* * * *

Modelo 4 EXE de medidor termostático Bassler; presión de trabajo, 500 lbs. por pulgada cuadrada; registra exactamente como 5.000.000 de galones al mes, de butano-propano de 140 (A.P.I.) a 60 grados F.

* * * *

Compteur thermostatique Bassler Modèle 4EXE; pression de marche 500 lbs. au pouce carré, enregistrement précis de 5.000.000 gallons par mois, butane-propane 104 A.P.I. pris à 60° F.

BASSLER Meters are of positive piston displacement type designed to accurately measure all petroleum oils. They automatically correct for temperature differences and record all liquid as of a constant standard temperature. Bassler Meters for measuring crude oil production at the well are also equipped with samplers which give true proportional samples of all oil metered. They maintain extreme accuracy regardless of changes in flow rates, viscosities, pressures or temperatures. They furnish direct readings in any desired unit of measure. Manufactured for all capacities and pressures.

Outstanding features: **— Automatic temperature compensation; accuracy under all operating conditions, whether on suction or discharge side of pump; for metering of natural gasoline and derivatives as well as crude oil at the well. Used by U. S. Government for checking petroleum purchases, and accepted as standard equipment by many major oil companies.**

Los medidores BASSLER son del tipo de positivo desplazamiento de émbolo y están especialmente proyectados para medir con exactitud todo aceite de petróleo. Corrigen automáticamente las diferencias de temperatura y registran el líquido bajo una constante temperatura normal. Los medidores Bassler para medir la producción de petróleo crudo en el pozo están también equipados con tomadores de muestras que dan verdaderas muestras proporcionales de todo el petróleo medido. Mantienen una exactitud extrema, independientemente los cambios en régimen de corriente, viscosidad, presión y temperatura. Suministran acusaciones directas en cualquiera unidad de medición que se indique. Se ofrecen para todo capacidad y presión que se indiquen.

Ventajas sobresalientes: Compensación automática de la temperatura; exactitud bajo toda condición de operación, tanto en el lado de aspiración como en el de descarga de la bomba; para medir gasolina natural y derivados, lo mismo que petróleo crudo en el pozo. Se emplean por el Gobierno de los E.U.A. para verificar compras de petróleo y están aceptados como equipo normal por muchas importantes compañías de petróleo.

Les compteurs BASSLER sont du type à déplacement positif de piston, conçus pour mesurer avec précision toutes les huiles de pétrole. Ils tiennent automatiquement compte des différences de température et enregistrent pour tout liquide comme étant à une température standard constante. Les compteurs Bassler pour mesurer la production de pétrole brut au puits sont aussi munis d'échantillonneurs qui donne des échantillons proportionnels vrais de tout pétrole mesuré. Ils conservent une précision extrême indépendamment des changements de vitesses d'écoulement, de viscosités, pressions ou températures. Ils donnent des lectures directes en tout système de mesure désiré. Prévu pour toutes capacités et pressions.

Caractéristiques saillantes: — Correction automatique de température; précision dans toutes les conditions de marche, que ce soit sur côté aspirant ou refoulant de la pompe; pour le mesurage de l'essence naturelle et de ses dérivés ainsi que du pétrole au puits même. Utilisé par le Gouvernement des E.U. pour vérifier les achats pétroliers et reconnu équipement standard par de nombreuses compagnies pétrolières d'élite.

Refer to 1937 Composite Catalog, pgs. 98-99

AMERICAN LIQUID METER CO.

Box 87, Alhambra, California, U.S.A.

South American Distributors: R. J. Eiche, Los Angeles, and Geo. S. Flanders, Trinidad.

Processes which involve major revisions in the normal refinery routine or represent entirely new commercial developments, such as polymerization, the manufacture of isooctane, or solvent refining and dewaxing, are in the laboratory for years before the rank and file of the industry hears of them as commercial processes. It usually takes from 5 to 15 years to work out the semi-commercial operation found workable in the laboratory.

EQUIPMENT COMPANIES

Refinery equipment companies have been called upon in recent years to assume an increasing portion of the technical and financial burden involved in this development work and, although the industry paid the bills in the end, the work of these equipment manufacturers must receive recognition in a favorable light.

MADE BY SYNTHESIS

Modern oil refining is ceasing to be a simple distillation process and is assuming more and more the procedure of the chemical industry, namely, the synthesis of products from raw materials. In short, modern refining makes gasoline, fuel oils and lubricants from the hydrogen and carbon contained in the crude oil and is recovering less and less of these materials in the combined form as they occur naturally in the crude oil.

This is due, not to any marked improvement in the art of synthesis over the art of recovery by distillation, but because the products which occur naturally in crude oil are not sufficiently high in quality to meet the exacting needs of modern motors and machinery.

So, if one is to study trends in refining technique it is necessary to understand trends in oil marketing demands and the following discussion of changes in refinery equipment keeps this in the foreground.

EFFECT OF METALLURGY

It should be understood, also, that many of the changes in refining and equipment we now see are the results of improvements in the technique of other major industries. For instance, the manufacture of high-octane gasoline has been made possible only through the supplying of cheap alloys of chromium, tungsten, silicon, aluminum, molybdenum, copper, nickel and columbium by the steel industry. These metals, when used in the most advantageous proportions, give refiners materials with which engineers may build vessels standing much higher temperatures and pressures than ever before and more severe corrosive conditions. Steels for abnormally low temperature work have also become essential.

Refiners may expect substantial additional contributions from the steel industry over the future in the form of still stronger, more resisting steel alloys, which will enable them to build still bigger units, operate them at still higher temperatures and pressures and make still better oil products. Utilizing methane for the manufacture of motor fuels is one objective awaiting better steels.

METALS AND ALLOYS

Two fields of study have attracted particular attention, namely (1) metals for low temperature service and (2) low percentage alloy steels for pipestill and boiler tube service.

The recent advancements in low temperature

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marquées du processus habituel de raffinerie ou quit sont des développements commerciaux tout à fait nouveaux, comme la polimérisation, la fabrication de l'isooctane, ou encore le raffinage et déparaffinage des solvants, sont étudiés au laboratoire pendant des années avant que le gros de l'industrie en entende parler en tant que procédés commerciaux. Il faut en général compter de 5 à 15 ans pour mettre au point l'application semi-commerciale d'un procédé qu'on a élaboré au laboratoire.

FABRICANTS DU MATERIEL

Au cours de ces dernières années. on a demandé des fabricants de matériel de raffinerie une participation croissante à la charge technique et financière impliquée par ces recherches, et bien qu'en fin de compte ce soit l'industrie pétrolière qui paie ces frais, il n'en faut pas moins voir le travail de ces fabricants de matériel sous un jour favorable.

PRODUCTION PAR SYNTHESE

Le raffinage moderne du pétrole cesse d'être une simple distillation et revêt de plus en plus le trait dominant de l'industrie chimique, à savoir la synthèse de produits à partir de matières premières. En un mot, le raffinage moderne fabrique l'essence, les fuel oïls et les lubrifiants à partir de l'hydrogène et du carbone que contient le pétrole brut et recueille de moins en moins de ces substances sous la forme combinée qu'on trouve à l'état naturel dans le pétrole brut.

Ceci est dû, non à progrès marqué de la technique de synthèse par rapport à la technique d'extraction par distillation, mias à ce que les produits qu'on trouve à l'état natif dans le pétrole brut ne sont pas d'une qualité assez bonne pour répondre aux grandes exigences des moteurs et des machines modernes.

Par suite, quand on aborde l'etude des tendances de la technique de raffinage, il est nécessaire de saisir tout d'abord les tendances des exigences de la vente des produits pétroliers, ce que met au premier-plan la discussion qui suit de l'évolution du matériel de raffinerie.

EFFET DE LA METALLURGIE

Il faut saisir, en outre, que bone nombre des changements survenus dans le raffinage et le matériel sont le résultat de progrès réalisés dans la technique d'autres grandes industries. Par exemple, la fabrication de l'essence à forte teneur d'octane n'a été rendue possible que grâce à la fourniture d'alliages bon marché au chrome, au tungstène, au silicium, à l'aluminium, au molybdène, au cuivre, au nickel et au columbium par l'industrie de l'acier. Quand on les emploie aux doses les plus favorables, on obtient avec ces métaux des alliages de raffinerie dont les ingénieurs peuvent faire du matériel qui résiste à des températures et des pressions beaucoup plus fortes que dans le passé, ainsi qu'aux actions les plus corrosives. On a aussi mis au point des aciers qui résistent aux températures très basses de certaines opérations.

Les raffineurs peuvent compter sur de nouvelles contributions décisives de la part de l'industrie de l'acier dans l'avenir sous la forme d'alliages d'acier encore plus tenaces et plus résistants, grâce auxquels ils pourront fabriquer des installations encore plus grandes, supportant des températures et des pressions encore plus fortes pour donner des produits pétroliers encore meilleurs. L'utilisation du méthane pour la préparation de carburants moteurs est un objectif dont la réalisation attend de meilleurs aciers.

METAUX ET ALLIAGES

Deux domaines d'étude ont retenu surtout l'attention, à savoir (1) les métaux pour opérations à basse température, et (2) les aciers spéciaux dits à faible teneur pour alambics tubulaires et pour tubes de chaudières.

Les progrès récents réalisés dans le domaine des traitements et du déparaffinage à basse température ont suscité une demande en aciers aptes à conserver leur résistance aux chocs et leur ductilité à des températures pouvant descendre

(Continué sur Page 232)

que representan desarrollos comerciales enteramente nuevos, tales como la polimerización, la manufactura de isoctano o la refinería por solvente y desparafinación, están en al laboratorio durante muchos años, antes de que los miembros de la industria, en general, sepan de ellos como procedimientos comerciales. Generalmente se requieren de 5 a 15 años para desarrollar la operación semicomercial descubierta como utilizable en el laboratorio.

COMPANIAS DE EQUIPO

Las compañías de equipo de refinería han sido llamadas, estos últimos años, a asumir una creciente parte de la carga técnica y financiera comprendida en este trabajo de desarrollo, y a pesar de que la industria ha pagado la cuenta, al final, la labor de estos fabricantes de equipo debe recibir reconocimiento desde un punto de vista favorable.

HECHO POR SINTESIS

La moderna refinación de petróleo está dejando de ser un sencillo procedimiento de destilación, pues está asumiendo progresivamente el caracter del procedimiento de la industria química, es decir, la síntesis de productos de materias primas. En resúmen, la refinación moderna hace gasolina, aceites combustibles y lubricantes del hidrógeno y carbono contenido en el petróleo crudo y está recobrando menos y menos de estos materiales en la forma combinada, tal como se presentan naturalmente en el petróleo crudo.

Esto se debe no a algún notable perfeccionamiento en el arte de la síntesis sobre el arte de la recuperación por destilación, sino a que los productos que se presentan naturalmente en el petróleo crudo no son suficientemente altos en calidad para satisfacer los exigentes requisitos de los motores y maquinaria modernos.

Por esta razón, cuando uno estudia las tendencias en la técnica de la refinación, es necesario comprender las tendencias en la demanda existente en el mercado del petróleo, y la discusión siguiente de los cambios en equipo de refinería sirve para mantener todo ésto en la mente.

EFECTO DE LA METALURGIA

Debe también recordarse que muchos de los cambios en procedimientos de refinación y equipo, que tenemos ahora, son el resultado de mejoramientos en la técnica de otras industrias importantes. Por ejemplo, la manufactura de gasolina de elevado octano se ha hecho posible únicamente gracias al abastecimiento de baratas aleaciones de cromo, tungsteno, silicio, aluminio, molibdeno, cobre, níquel y columbio por parte de la industria del acero. Estos metales, cuando se utilizan en las proporciones más ventajosas, dan a los refinadores materiales con los cuales los ingenieros pueden construir receptáculos que resisten temperaturas y presiones mucho más altas que nunca, ofreciendo, al mismo tiempo una acrecentada resistencia a condiciones corrosivas de mayor severidad. Los aceros para herramientas expuestas a temperaturas anormalmente bajas se han hecho también esenciales.

Los refinadores pueden, en realidad, esperar adicionales contribuciones de la industria del acero, en lo futuro, en la forma de aleaciones de acero más firmes y resistentes, que les permitan hacer unidades todavía más grandes, operarlas a temperaturas y presiones todavía más altas y producir productos de petróleo mucho mejores todavía. La utilización del metano en la manufactura de combustibles para motores es un objetivo, que aguarda la llegada de mejores aceros.

METALES Y ALEACIONES

Dos campos de estudio han despertado particular atención: (1) metales para servicio de baja temperatura y (2) aleaciones de acero de bajo porcentaje para alambiques y tubos de caldera.

Los recientes progresos en los procedimientos de desparafinación y tratamiento, a baja temperatura, han resultado en una demanda de aceros que puedan retener su resistencia al choque y ductibilidad a temperaturas tan bajas como 50 grados F.

(Continué en Página 232)

GET FOOL PROOF *Certainty*

A JOHNSTON TEST IN FOUR SIMPLE STEPS

Here's the way a Johnston Tester gets the Formation Facts that enable you to plan the development of your well *before you set casing!*

The first step shows the Tester just after the packer has seated in the prepared seat, but before any of the valves have opened. The closed Trip and Main Valves have served as a DOUBLE SEAL in keeping the drill pipe dry while running in the hole, and note in succeeding steps how simply and positively these valves open when the proper time comes.

The Main (or Retaining) Valve opens first as the weight of the drill string lowered against the packer compresses the spring that has held it shut, and allows formation fluid to enter as far as the closed Trip Valve. Note how the Main Valve operates by a simple lowering of the drill pipe—no twisting or turning!

The Patented Trip Valve is then opened by the impact of a go-devil dropped through the pipe (but if any leaks have let fluid into the pipe from above, the valve doesn't open—an exclusive safety precaution that prevents confusing drill pipe leaks with actual formation tests). With the Trip Valve opened and the mud pressure held back by the packer, the formation is free to flow *under actual producing conditions.* Formation fluids rush into the empty drill pipe while perfect control of the well is maintained by the mud column above the packer.

With the test completed a mere lifting of the drill string (still no twisting or turning!) allows the compressed spring to expand and close the Main Valve, trapping formation fluid in the pipe to be brought to the surface for close inspection and laboratory test. Continued lifting of the pipe opens the patented Equalizing Valve which allows fluid from above the packer to enter the test section, equalizing the pressure above and below the packer and relieving the tremendous weight of the mud column *before the packer is lifted from the seat.* This vital safety device eliminates the enormous strain on rig and equipment of pulling the packer loose against the hydrostatic pressure of the mud column in the well, and the M. O. JOHNSTON Oil Field Service Corp. is the SOLE LICENSEE PERMITTED TO USE IT!

In practically every oil producing country throughout the world the Johnston Formation Tester is *the* recognized standard for guiding development programs in both proved and unproved territories. It enables the operator to test quickly and accurately every questionable formation he encounters, and to determine BEFORE CASING IS SET exactly which sands are wet, which are dry, which are oil, which are water. Using the Johnston Tester to gather the Formation Facts, he plans the complete development of the well *in advance* . . . makes one string of casing do the work of many . . . and knows *definitely* that every step he makes is a *right* step toward the best completion of the well.

The Johnston Formation Tester has forged to the top through sheer merit, for it is the only tool that offers the fool-proof certainty of these outstanding performance features:

AUTOMATIC VALVES that operate without risky twisting or turning of the drill string. This exclusive safety feature eliminates the twist-off hazard present in other testing devices.

PATENTED TRIP VALVE that automatically differentiates between an actual formation test and a drill pipe leak. This exclusive feature assures the ultimate in testing *accuracy!*

PATENTED EQUALIZING VALVE (licensed exclusively to the M. O. Johnston Oil Field Service Corp.) that balances the pressures above and below the packer before it is lifted from the seat. This is another exclusive safety feature that eliminates excessive lifting strains from your rig and equipment when pulling the packer loose.

Speed up your drilling schedule, slash your casing costs, and GET AN ALL AROUND BETTER WELL with this modern fact-finder guiding the way! Our illustrated booklet will show you how. It's free—write for it today!

WHY SET CASING BEFORE YOU KNOW?

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"Servicing Mid-Continent and Gulf Coast"

DON'T TAKE A CHANCE

WITH A JOHNSTON TESTER

UN ESSAI JOHNSTON EN QUATRE PHASES SIMPLES

Voici comment un vérificateur Johnston obtient les données de gisement qui permettent la mise au point du plan d'exploitation d'un puits *avant de poser le revêtement!*

La 1ère phase montre le vérificateur juste après que la garniture s'est posée dans le siège préparé, mais avant qu'aucune des vannes se soit ouverte. Les vannes fermées de déclic et de conduite ont servi de DOUBLE JOINT en maintenant le tuyau de foret à sec pendant la descente dans le trou, et vous noterez dans les phases suivantes la manière simple et positive avec laquelle ces vannes s'ouvrent au moment voulu.

La vanne de conduite (ou de retenue) s'ouvre la première quand le poids de la colonne de forage descendue contre la garniture comprime le ressort qui la maintenait fermée, ce qui permet au fluide du gîte d'arriver jusqu'à la vanne à déclic. Notez que la vanne de conduite fonctionne simplement en descendant le tuyau de forage—rien à tourner ou tordre.

La vanne à déclic brevetée s'ouvre alors sous le choc d'un "go-devil" qu'on fait descendre par le tuyau (mais si une fuite a laissé du liquide venir dans le tuyau par au-dessus, la vanne ne s'ouvre pas—un dispositif exclusif de sûreté qui empêche de confondre les fuites de tuyau de forage avec des essais de formation effectifs). La vanne à déclic étant ouverte et la pression de boue retenue par la garniture, le gîte est libre de s'écouler *dans les conditions de production réelles*. Les fluides de gisement se déversent dans le tuyau de foret vide, alors qu'un contrôle parfait du puits est maintenu par la colonne de boue au-dessus de la garniture.

L'essai étant terminé, il suffit de soulever la colonne de forage (toujours rien à tourner ou à tordre!) pour permettre au ressort comprimé de se détendre et de fermer la vanne de conduite, enfermant le fluide de gisement dans le tuyau à amener à la surface pour examen de près et essai de laboratoire. En continuant à lever le tuyau on provoque l'ouverture de la vanne équilibreuse brevetée qui laisse le liquide au-dessus de la garniture entrer dans la section à essai, égalisant la pression au-dessus et en-dessous de la garniture et soulageant le poids énorme de la colonne de boue *avant de soulever la garniture de dessus le siège*. Ce dispositif de sûreté vital supprime la fatigue énorme sur l'appareillage et l'équipement quand on tire la garniture lâche contre la pression hydrostatique de la colonne de boue dans le puits, et la M. O. JOHNSTON Oil Field Service Corp. est SEULE A AVOIR UNE LICENCE L'AUTORISANT A L'EMPLOYER!

Dans pour ainsi dire tout pays producteur de pétrole du monde, le vérificateur de gisement Johnston est *le* standard reconnu dans la mise au point des programmes d'exploitation tant dans les régions prouvées que celles non encore prouvées. Il permet à l'opérateur de vérifier vite et avec précision tout gîte douteux qu'il rencontre, et de déterminer AVANT DE POSER LE REVETEMENT exactement quels sables sont imbibés, quels sables sont secs, et ce qu'il y a en pétrole et en eau. Ayant employé le vérificateur Johnston pour obtenir les données du gîte, il fait le plan complet de l'exploitation du puits *à l'avance* . . . fait ainsi faire à une colonne de revêtement le travail de plusieurs . . . et sait *avec certitude* que chaque mesure qu'il prend est une mesure *correcte* menant à l'achèvement optimum du puits. Le vérificateur de gisement Johnston s'est frayé son chemin par son mérite seul, car c'est le seul outil qui offre la certitude d'indéréglabilité qui va avec les caractéristiques de fonctionnement saillantes qui suivent:

VANNES AUTOMATIQUES qui fonctionnent sans l'incertitude de devoir tourner ou tordre le câble de foret. Ce dispositif de sûreté exclusif élimine le risque de déviation toujours présent avec les autres appareils vérificateurs.
VANNE A DECLIC BREVETEE qui différencie automatiquement entre un essai de gisement effectif et une fuite de tuyau de forage. Ce dispositif exclusif assure le maximum en *précision* d'essai!

VANNE EQUILIBREUSE BREVETEE (licence exclusive à la M. O. Johnston Oil Field Service Corp.) qui équilibre les pressions au-dessus et en-dessous de la garniture avant de la soulever de dessus le siège. C'est un autre avantage de sûreté exclusif qui supprime les fatigues de levage excessives sur votre appareillage et matériel quand on tire sur la garniture lâche.

Activez vos plans de forage, réduisez vos frais de revêtement et OBTENEZ UN PUITS MEILLEUR A TOUS EGARDS au moyen de cet instrument documentateur moderne pour vous guider! Notre brochure illustrée vous montrera comment. Elle est gratuite—demandez-la nous dès aujourd'hui!

POURQUOI POSER LE REVETEMENT AVANT DE SAVOIR?

UN ENSAYO JOHNSTON EN CUATRO PASOS SENCILLOS

He aquí cómo un ensayador Johnston obtiene los datos acerca de la formación, que le habilitan a Ud. para formular el desarrollo de su pozo *antes de colocar el revestimiento.*

El primer paso muestra el ensayador, después de que el obturador queda colocado en el asiento que se le ha preparado, pero antes de ninguna de las válvulas se haya abierto. Las válvulas cerradas de disparo y de retención han servido como un DOBLE CIERRE, para mantener seco el tubo de perforación, mientras pasa por el agujero, y obsérvese, en los pasos siguientes, con qué facilidad se abren cuando les llega su turno.

La válvula principal o de retención se abre primero, cuando el peso de la columna de perforación descendido sobre el obturador comprime el resorte que la ha mantenido cerrada, permitiendo que el líquido de la formación entre hasta la válvula de disparo cerrada. Obsérvese cómo la válvula principal o de retención funciona sencillamente bajando el tubo de perforación —sin necesidad de doblarse o girarse.

La válvula de disparo, patentada, se abre ahora, por el choque de un go-devil descendido por el tubo (pero si por escape ha entrado algún líquido en el tubo, por arriba, la válvula no se abre—una precaución exclusiva de seguridad, que evita confundir los escapes por el tubo de perforación con los ensayos efectivos de la formación). Con la válvula de disparo abierta, y con la presión del lodo retenida por el obturador, la formación queda libre para la emanación *bajo verdaderas condiciones de producción*. Los flúidos del yacimiento entran al tubo de perforación vacío, mientras el pozo se mantiene en perfecto control por la columna de lodo encima del obturador.

Terminado el ensayo, basta con levantar la columna de perforación (sin que todavía haya nada que girar o doblarse) para hacer que el resorte comprimido se extienda y cierre la válvula principal o de retención atrapando el líquido del yacimiento dentro del tubo, para sacarlo a la superficie y someterlo a prolija inspección y ensayo de laboratorio. La continuación del levantamiento del tubo abre la válvula de compensación, patentada, que permite que el líquido arriba del obturador entre en la sección de ensayo, equilibrando la presión arriba y abajo del obturador y aliviando el enorme peso de la columna de lodo, *antes de que el obturador se levante de su asiento*. Este esencial dispositivo de seguridad elimina la enorme tensión impuesta sobre el aparejo y el equipo para aflojar el obturador contra la presión hidrostática de la columna de lodo en el pozo, y la M. O. JOHNSTON Oil Field Service Corp., es la única compañía QUE TIENE PERMISO EXCLUSIVO PARA EMPLEARLO.

En casi todos los países productores de petróleo del mundo, el ensayador de formación o yacimiento Johnston es *la norma* universalmente aceptada, en la preparación de los programas de explotación, tanto en los campos o regiones ya exploradas, como en las por explotarse y reconocerse. Permite al interesado ensayar rápida y exactamente todo yacimiento dudoso que descubra, y determinar, ANTES DE LA COLOCACION DEL REVESTIMIENTO, exactamente qué arenas son las húmedas, qúe arenas son las secas y cuáles contienen petróleo y cuáles agua. Empleando el ensayador Johnston para obtener datos sobre la formación o yacimiento, el interesado proyecta entonces el completo desarrollo del pozo con bastante *anticipación* . . . hace que una sola columna de revestimiento haga el trabajo de muchas . . y sabe *definitivamente* que todo paso que dé es un paso correcto hacia la mejor terminación del pozo.
El ensayador de formación Johnston ha sobresalido en la industria debido únicamente a sus méritos propios, pues es la única herramienta que ofrece la seguridad invariable de correcto funcionamiento debido a los rasgos siguientes:
VALVULAS AUTOMATICAS, que funcionan sin la incerteza de tener que girar o torcer la columna de perforación. Este exclusivo rasgo de seguridad suprime el peligro de la desviación que se presente en otros aparatos de ensayo.
VALVULA DE DISPARO PATENTADA, que diferencia automáticamente entre un ensayo efectivo de yacimiento o formación y un escape por el tubo de perforación. Este rasgo exclusivo asegura lo máximo en *precisión* de ensayo.
VALVULA DE COMPENSACION PATENTADA (permiso exclusivo concedido a la M. O. Johnston Oil Field Service Corp.) que equilibra las presiones arriba y abajo del obturador, antes de que éste sea levantado de su asiento. Este es otro rasgo exclusivo, que elimina los excesivos esfuerzos de levantamiento sobre el aparejo y el equipo, al soltar o quitar el obturador.
Active sus planes de perforación, reduzca sus gastos de revestimiento y OBTENGA UN POZO MUCHO MEJOR, EN TODO SENTIDO, mediante este instrumento que obtiene datos exactos para su guía. Nuestro folleto ilustrado le dará información completa. Pídanos ahora mismo un ejemplar. Se lo enviaremos gratuitamente.
¿ PARA QUE COLOCAR EL REVESTIMIENTO ANTES DE ESTAR BIEN SEGURO?

USE A JOHNSTON TESTER!

dewaxing and treating processes have resulted in a demand for steels that will retain their shock resistance and ductility at such low temperatures as minus 50° F. Solid solution types of alloys and alloy steels are most suitable for such conditions but the high cost of monel metal and stainless steels has resulted in the adoption of low percentage alloy steels as a compromise between cost and performance. Nevertheless, some of the alloy steels are so satisfactory, notably the soluble-element steels, that there is no need to resort to expensive pure solid solution alloys.

For many years the use of alloy steels for pipestill tubes has been confined to conditions involving severe corrosion whereas low alloy steels are now being used for almost all pipestill tubes because of their greater strength and cheapness as compared with carbon steel. The alloy elements that are found to be particularly useful are molybdenum for high temperature strength, silicon or chromium for high temperature oxidation resistance and, more recently, steels containing aluminum as well as the aforementioned elements. The cost of low percentage alloy steel tubes is now lower than the cost of carbon steel if compared on a strength basis.

The use of X-ray examinations for welded equipment is becoming more and more common particularly for large fired pressure vessels. Wide interest has also centered on methods of lining or coating vessels, pipe lines, pumps, etc., with corrosion resistant materials. The most widely used material is 18-8 chrome nickel steel and most large companies now have methods of sheathing or covering pressure vessels with such alloys.

Many studies of high temperature strength such as creep strength, are being conducted and more and more attention is being given to short-time tests that may be used to replace the cumbersome long-time tests now necessary in determining high temperature strength.

INSTRUMENTATION

Another vital factor enabling refiners to carry on this new type of complicated procedure in manufacture is the almost standard practice of using automatically operated control devices and recording control instruments.

The general application of these has not only fostered the development of not only much more complicated equipment but has made possible the economic operation of much larger equipment. These control devices have actually simplified the duties and responsibilities of the operator. They are principally responsible for enabling the refinery operator to receive the highest wage among skilled workmen of all major industries. They have raised the standard of men employed as well as the working conditions within the plant.

What has been said in regard to the change in refining procedure from simple distillations to synthesis is also typified in the changes which the manufacture of gasoline is now undergoing. It is significant that in 1936 more gasoline was manufactured by syntheses or cracking than was recovered from crude as straightrun. The past year also marked the beginning of large scale manufacture of isooctane. New polymerization plants were installed in every major refining area and the commercial polymerization of butane gas to make motor fuels also become a commercial actuality.

COMBINATION UNITS

It is not difficult to combine in one operation the thermal decomposition of heavy fractions of the crude (cracking), decomposition of lighter

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jusqu'à - 50° F. Les types à solutions solides d'alliages et d'aciers spéciaux sont les plus indiqués pour ces conditions, mais le coût élevé du métal monel et des aciers inoxydables a conduit à l'adoption des aciers spéciaux à faible teneur à titre de compromis entre le coût et le rendement. Remarquons toutefois que certains des aciers spéciaux sont si satisfaisants, en particulier les aciers à éléments solubles, qu'il n'y a pas lieu de recourir aux alliages coûteux à pure solution solide.

Pendant bien des années l'emploi des aciers spéciaux pour les tubes d'alambics tubulaires s'est limité aux cas comportant une corrosion prononcée, alors qu'on utilise maintenant les aciers spéciaux dits à basse teneur pour presque tous les tubes d'alambics tubulaires, et cela à cause de leur plus grande ténacité et de leur moindre prix par rapport à l'acier au carbone. Les éléments d'alliage qu'on a trouvés les plus utiles à cette fin sont le molybdéne pour sa résistance aux hautes températures, le silicium ou le chrome pour leur résistance à l'oxydation aux fortes températures, et, plus récemment, les aciers à teneur d'aluminium en plus des éléments nommés plus haut. Le coût des tubes en acier spécial à basse teneur est maintenant plus bas que le prix de revient de l'acier au carbone si la comparaison tient compte des pouvoirs de résistance.

L'emploi des examens aux rayons X pour le matériel soudé devient de plus en plus courant, surtout pour les grands récipients sous pression et au feu. On a vu aussi un intérêt croissant se porter sur les méthodes de revêtement des récipients, des conduites, des pompes, etc., au moyen de substances résistant à la corrosion. La matière la plus couramment employée à cette fin est l'acier au chrome-nickel 18-8, et la plupart des grandes compagnies ont maintenant des méthodes pour couvrir ou revêtir les récipients sous pression de ces alliages.

On conduit en ce moment de nombreuses études sur la résistance aux hautes températures, notamment sur la force de cheminement, et on vise à mettre au point des essais de courte durée destinés à supplanter les essais incommodes de longue durée qu'on doit encore maintenant employer aux fins de déterminer la résistance aux hautes températures.

GENERALISATION DES INSTRUMENTS

Un autre facteur vital qui permet aux raffineurs d'appliquer ce nouveau type compliqué de processus de fabrication est la pratique presque devenue standard d'utiliser des appareils de contrôle automatiques et des instruments de contrôle enregistreurs.

La généralisation de leur emploi a non seulement favorisé l'élaboration d'un équipement beaucoup plus compliqué, mais a rendu possible l'utilisation économique d'un matériel beaucoup plus grand. Ces dispositifs de contrôle ont en fait simplifié les devoirs et responsabilités de l'opérateur. C'est en grande partie grâce à eux que l'operateur de raffinerie touche le plus haut salaire parmi les ouvriers spécialisés de toutes les grandes industries. Ce sont eux qui ont élevé le standard des ouvriers de raffinerie, ainsi que les conditions de leur travail.

Ce qui a été dit au sujet de l'évolution du processus de raffinage, tendant à substituer la synthèse à la distillation simple, s'applique aussi à l'évolution actuelle de la fabrication de l'essence. Il est significatif que, durant 1936, davantage d'essence a été faite par synthèse ou cracking que par distillation de pétrole brut. L'année passée a marqué aussi le début de la fabrication de l'isooctane sur une grande échelle. Enfin, de nouveaux ateliers de polimérisation ont été installés dans chaque centre important de raffinage et la polimérisation commerciale du gaz butane pour faire des carburants moteurs est devenue une actualité commerciale.

GROUPES-COMBINAISONS

Il n'est pas difficile de combiner en une seule opération la décomposition thermique de fractions lourdes de pétrole brut (cracking), la décomposition de fractions plus légères (réformation), et la distillation non poussée d'une quantité fixée à l'avance d'essence de distillation, de pétrole lampant, de distillés, de gaz oïl, et de distillé de cire.

(Continué sur Page 240)

bajo cero. Los tipos de solución sólida de aleaciones y aceros de aleación son los más adaptables a semejantes condiciones, pero el subido precio del metal monel y de los aceros inoxidables ha resultado en la adopción de aceros de aleación de bajo porcentaje, como una avenencia entre el costo y el funcionamiento. Sin embargo, algunos de los aceros de aleación son tan satisfactorios, principalmente los aceros de elementos solubles, que no hay ninguna necesidad de recurrir a las costosas aleaciones de pura solución sólida.

Durante muchos años, el empleo de aleaciones de acero se limitó a condiciones que presentaban acentuada corrosión, pero hoy día se utilizan en la fabricación de casi todos los tubos de alambique, debido a su mayor resistencia y economía en precio, en comparación con el acero al carbón. Los elementos de aleación que resultan particularmente útiles son molibdeno para gran resistencia a las altas temperaturas, silicio o cromio para resistencia a oxidación bajo grandes temperaturas, y más recientemente, aceros que contienen aluminio, en adición a los elementos anotados. El costo de los tubos de acero de aleación de poco porcentaje es ahora más bajo que el del acero al carbón, al compararse sobre la base de resistencia.

El empleo de la inspección mediante rayos X, apliacada a equipos soldados se está difundiendo rápidamente, particularmente en conexión con recipientes de presión subjetos a grandes temperaturas. Mucho interes existe también en los métodos de revestir o forrar recipientes o receptáculos, tuberías, bombas, etc., con materiales resistentes a la corrosión. El material de mayor utilización, en este sentido, es la aleación de acero al cromo y níquel de 18-8. Casi todas las grandes compañías tienen ahora adecuados métodos de revestir o forrar los recipientes de presión con semejantes aleaciones.

Se están haciendo muchos estudios de la intensidad de las altas temperaturas, como, por ejemplo, la fuerza del deslizamiento, y se está dando cada vez mayor atención a los ensayos de corto tiempo, en reemplazo de los ensayos de largo tiempo, que a pesar de todos sus inconvenientes, son ahora necesarios para determinar la fuerza de las elevadas temperaturas.

INSTRUMENTOS

Otro factor vital que permite a los refinadores llevar a cabo este nuevo tipo de complicado procedimiento en la manufactura es la casi normal práctica de emplear aparatos de gobierno e instrumentos registradores de funcionamiento automático.

La aplicación general de estos aparatos e instrumentos ha propendido no sólo al desarrollo de un equipo más complicado, sino que ha hecho posible la operación económica de un equipo mucho más grande. Estos instrumentos de gobierno han verdaderamente simplificado los deberes y responsabilidades de los explotadores. Por otra parte, son responsables, en gran medida, por los beneficios que han aportado a los trabajadores en las refinerías, quienes son los que reciben los jornales más altos entre todos los operarios expertos al servicio de importantes industrias nacionales. Han elevado los sueldos o jornales de los trabajadores y al mismo tiempo mejorado notablemente las condiciones del trabajo dentro de las refinerías.

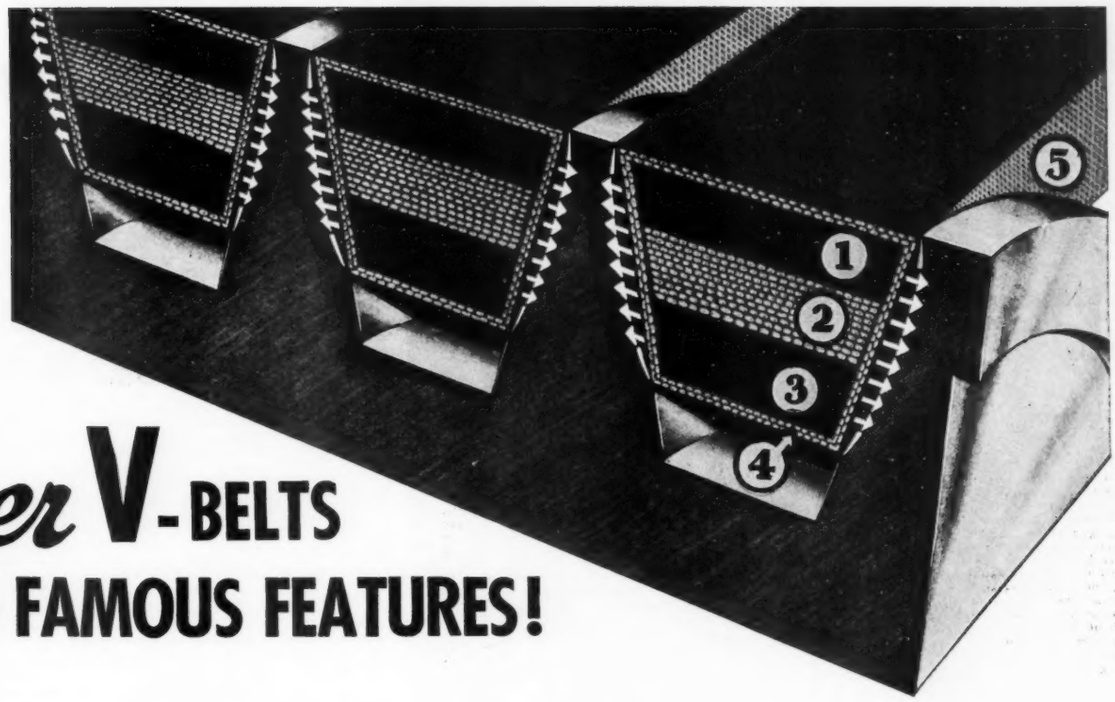
Lo que se ha dicho en relación con el cambio en procedimiento de refinación, desde las sencillas destilaciones hasta la síntesis, se tipifica también en las modificaciones que ahora se presentan en la manufactura de gasolina. Muy interesante es observar que en 1936 se manufacturó más gasolina por síntesis o "cracking," que la recuperada del petróleo crudo como esencia de destilación. El año pasado marcó también el comienzo de la manufactura, en grande escala, del isooctano. Se construyeron nuevas instalaciones de polimerización, en todas las principales zonas de rafinación y la polimerización comercial del gas de butano, para hacer combustibles de motores, se hizo también una realidad comercial.

INSTALACIONES DE COMBINACION

No es difícil combinar en una sola ope ación la decomposición termal de las fracciones menos volátiles del petróleto crudo (cracking) la des composición de las fracciones más volátiles (reformación) y destilar sin presión una cantidad

(Continué en Página 240)

Gilmer BELTS

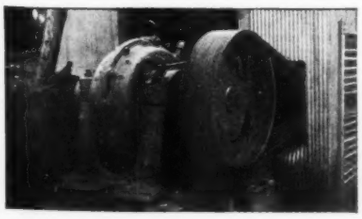


Gilmer V-BELTS give you 5 FAMOUS FEATURES!

Seven Gilmer V-Belts handling drive from natural gas engine to Jensen pumping unit.

Sept courroies trapézoïdales Gilmer assurant la transmission entre moteur à gaz naturel et groupe de pompage Jensen.

Siete correas en Gilmer aseguran una transmisión correcta entre un motor de gas natural y un grupo de bomba Jensen.



Ten Gilmer V-Belts used on a Case gas engine—Ideco pumping unit combination in the oil fields.

Dix courroies trapézoïdales Gilmer en service sur une combinaison moteur à gaz Case et groupe de pompage Ideco dans les champs de pétrole.

Diez correas en V Gilmer empleadas en una combinación de motor de gas Case y grupo de bomba Ideco en campos de petróleo.

Twelve Gilmer V-Belts operating an oil well drill in Roumania.

Deuze courroies trapézoïdales Gilmer actionnant une foreuse de puits de pétrole en Roumanie.

Doce correas en V Gilmer en funcionamiento en un equipo de perforación de pozo en Rumania.

1. TOP TENSION RUBBER — Tough, resilient, built to last, especially created by Gilmer engineers. Instantly flexes the belt around the sheave, locking it in position ready to work. Gilmer V-Belts do not waste time and power getting started.
2. RUBBER - LOCKED PULLING CORDS—Patented construction, concentrating brute strength in thin, strong, pulling section. The plies of Gilmer V-Belts will not pull apart.
3. HEAT - RESISTING BOTTOM RUBBER—Rugged and sturdy. Developed by Gilmer engineers. Insures cool running at high speeds. You avoid friction heat troubles by using Gilmer V-Belts.
4. DOUBLE JACKET—Makes a Gilmer V-Belt last 3 times as long! Distributes pressure evenly. The working parts of a Gilmer V-Belt are lastingly protected from attacks by oil, grease, and dirt.
5. CONTROLLED STRETCH — Pre-tested for under maximum loads. The permanently *matched* working lengths of Gilmer V-Belts for multiple drives guarantee powerful, uniform, even pull.

FREE CATALOGUE

1. CAOUTCHOUC A TENSION DE DESSUS — Tenace, résilient, prévu pour durer, réalisé spécialement par les ingénieurs Gilmer. Epouse instantanément la courroie sur la poulie, la fixant en position, en ordre de marche. Les courroies trapézoïdales Gilmer ne perdent ni temps ni énergie au démarrage.
2. CORDONS DE TRACTION A BLOCAGE CAOUTCHOUC — Construction brevetée, qui concentre la force brutale dans une section de traction mince et forte. Les épaisseurs des courroies trapézoïdales Gilmer ne peuvent se décoller.
3. CAOUTCHOUC DE FOND RESISTANT A LA CHALEUR—Robuste et tenace. Création des ingénieurs Gilmer. Il assure une marche sans échauffement aux fortes vitesses. En employant les courroies trapézoïdales Gilmer vous êtes sûr d'éviter les ennuis d'échauffement par friction.
4. MANCHON DOUBLE—Fait durer une courroie trapézoïdale Gilmer 3 fois plus longtemps! Répartit également la pression. Les pièces qui travaillent d'une courroie trapézoïdale Gilmer sont pour longtemps à l'abri des attaques des huiles, des graisses et de la crasse.
5. ETIRAGE REGLE — Essai préalable pour l'étirage sous charges maximums. Les longueurs motrices *conjuguées* en permanence des courroies trapézoïdales Gilmer pour transmissions multiples garantissent une traction puissante, uniforme et égale.

CATALOGUE GRATUIT

1. CAUCHO SUPERIOR DE TENSION—Tenaz, flexible, de gran duración, especialmente ideado por los ingenieros de la Gilmer. Dobla instantáneamente la correa alrededor de la polea, fijándola en posición, en orden de marcha. Las correas en V Gilmer no pierden tiempo ni energía en ponerse en acción.
2. CUERDAS DE TRACCION CERRADAS EN CAUCHO—Construcción patentada, que concentra la fuerza bruta en una sección de tracción delgada y fuerte. Las capas de las correas en V Gilmer no pueden separarse.
3. CAUCHO INFERIOR RESISTENTE AL CALOR—Firme y durable. Perfeccionado por los ingenieros de la Gilmer. Asegura un funcionamiento enfriado en las altas velocidades. Ud. evita los inconvenientes del calor resultante del rozamiento cuando emplea las correas en V Gilmer.
4. CUBIERTA DOBLE — Hace que la correa en V Gilmer dure tres veces más. La presión se distribuye uniformemente. Las piezas de trabajo de la correa en V Gilmer están permanentemente protegidas contra los ataques del aceite, grasa y polvo.
5. ESTIRAMIENTO REGULADO—Ensayo previo, para determinar el estiramiento bajo cargas máximas. Las longitudes de trabajo permanentemente *hermanadas* de las correas en V Gilmer, para transmisiones múltiples, garantizan una tracción poderosa, uniforme y segura.

CATALOGO GRATIS

L. H. GILMER COMPANY, Tacony, Philadelphia, U. S. A.

The Oldest Firm of Rubber Fabric Belt Specialists

R. & J. Dick Company
San Francisco, Cal., Seattle, Wash.
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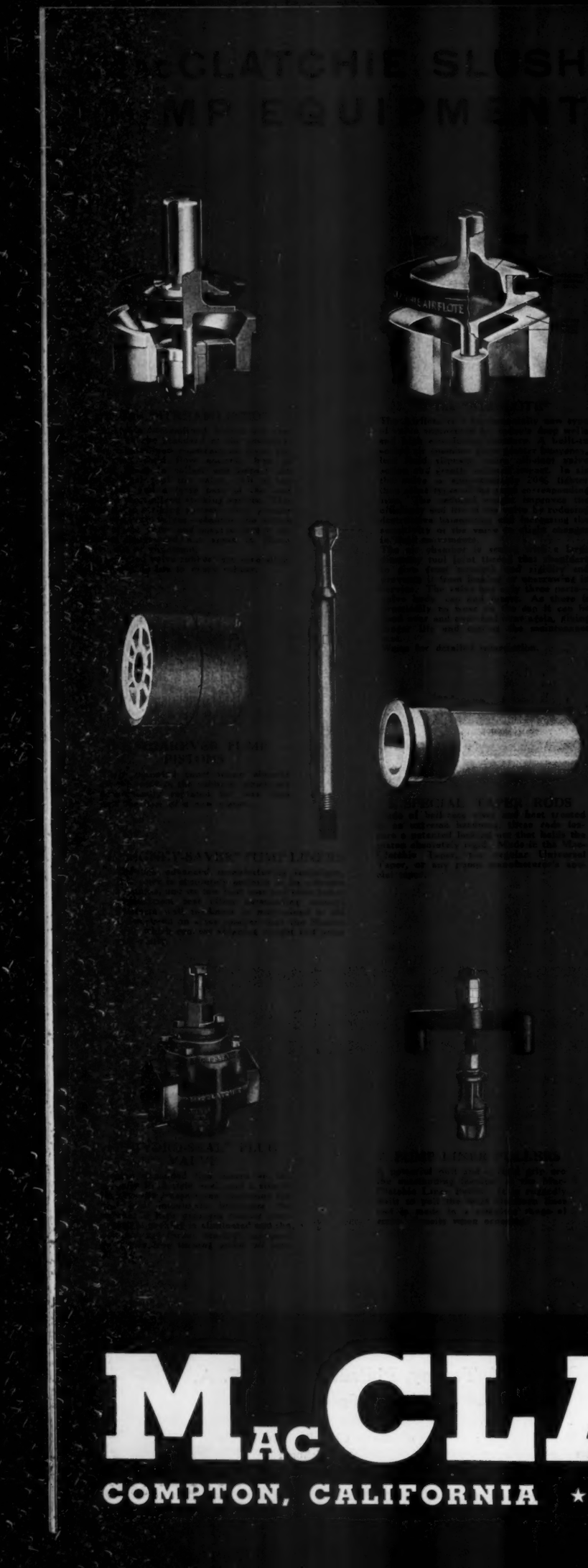

MacCLATCHIE

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MacCLATCHIE SLUSH PUMP EQUIPMENT CUTS PUMP MAINTENANCE COSTS

Operators the world over depend on MacClatchie Pump Parts for the most satisfactory and economical operation of their slush pumps. MacClatchie Mud Pump Valves, Pistons, Liners and Pump Rods are guaranteed to give the most satisfactory service. To prove their merit they will be sold on a satisfaction guarantee basis.

HOLE CONDITIONING

Years of experience in building hole-conditioning tools have developed MacClatchie Wall Scrapers and Underreamers to the point where they give the best possible performance. 3-Blade construction is responsible for their popularity. When it comes to Wall Scraping and Underreaming, insist on a MacClatchie.

CEMENTING

MacClatchie Quick Union and Cement Heads have been adopted as standard equipment throughout the world. Their popularity is due to the fact that they are unquestionably the speediest and most convenient on the market.

PLUG VALVES

MacClatchie Hydro-Seal Plug Valves are manufactured in screw, flange, and union ends. Hand or gear operated for working pressure from 250 lbs. to 3,000 lbs. Leakproof construction and a unique greasing system gives longer, more satisfactory wear.

CATHEADS

The high speeds at which many line shafts are being run in today's drilling operations make it practically imperative that a cathead be geared down to reduce the terrific impact when breaking tool joints. Conventional catheads, when slowed down, lose most of their power, but not the MacClatchie Gearomatic. Due to its patented gear arrangement, it rotates at HALF the line shaft speed yet gives DOUBLE the power.
It breaks the tightest joints with ease and without damage to tongs, tong dies, or other equipment.
A positive kick-out and slow motion insures greater safety. The positive kick-out permits one revolution and only one per pull. Consequently, there is no danger of fouled lines injuring workmen or damaging rig equipment when you use the MacClatchie Gearomatic Cathead.

GATE VALVES

The MacClatchie Perfection Valve is built on an entirely new principle wherein the sliding member is split vertically to form two parts. In opening and closing the valve there is ample clearance between sliding member and body to allow free frictionless operation. At the bottom and top of the stroke, however, built-in pawls cause the two valve segments to expand against the walls of the valve, completely sealing off the clearance space so that dirt, sediment, and scale cannot enter.
In the open position it gives a full sized opening through the valve. This feature not only means unrestricted fluid flow, but also longer valve wear due to the elimination of the "jetting action" which wears away conventional valves, especially where sand is present. The seating surface is protected at all times so that nothing can lodge to impair the operation of the valve.
The Perfection Valve is a self lubricated valve, containing space for grease to lubricate it over a long period. This feature assures friction-free operation.

HERRAMIENTAS MacCLATCHIE AHORRATIVAS DINERO

1. Los asientos perfilados tienen 40% más superficie de golpe para absorber el choque repetido que la válvula da a su asiento. Las piezas de caucho reversibles, patentadas, aseguran una duración doble, sin ningún aumento en gastos. La "perfilada" es la válvula de mayor venta del mundo.

3. EMBOLOS WEAREVER PARA BOMBAS

Su construcción patentada absorbe todo el desgaste en las piezas de caucho, las cuales pueden ser reemplazadas económicamente por menos de la mitad del precio de un émbolo nuevo.

4. FORROS DE BOMBA AHORRADORES DE DINERO

Gracias a una técnica de fabricación muy avanzada, este forro o camisa es rigurosamente uniforme y su bajo precio de compra y su reducido costo de repuesto representan economías muy considerables. En todo momento se mantiene uniforme espesor de pared, aun en los tamaños menores que el modelo Master, lo que reduce notablemente el peso de embarque y el costo del transporte.

5. VARILLAS CONICAS ESPECIALES

De acero especial, tratado térmicamente, para máxima resistencia, estas varillas se caracterizan por una tuerca de cierre patentada, que mantiene el émbolo absolutamente rígido. Se suministra con conicidad MacClatchie, con conicidad universal normal y en toda conicidad especial ofrecida por el fabricante de bombas.

6. VALVULA "HYDRO-SEAL"

Los rebordes extendidos de grasa aseguran un cierre absolutamente hermético al líquido, y una fácil vuelta al tornillo de grasa asegura bien el cierre y da completa lubricación a la válvula. En los modelos de alta presión, se suprime la empaquetadura comprimible y se emplean cojinetes de bolas de empuje para asegurar una rotación libre bajo todas las condiciones posibles.

7. EXTRACTORES DE FORROS DE BOMBAS

Una tracción poderosa y un agarro firme son los rasgos que caracterizan al extractor de forro de forros MacClatchie. Se hace muy poderoso, para sacar los forros más tenaces, y se ofrece en un surtido completo de tamaños. Indíquese el tamaño en el pedido.

8. TORNO AUTOMATICO GEAROMATIC

Con una desmultiplicación de 2 a 1, este torno poderoso da una tracción doble a la mitad de la velocidad del árbol del cable. Tiene un dispositivo de seguridad inviolable, que permite una vuelta *solamente*, por cada tiro, evitando así todo peligro.

9. VALVULA DE COMPUERTA PERFECTION

Un nuevo tipo de válvula de compuerta, con abertura y con lubricación automáticas, que da un servicio seguro y muy durable a un costo de conservación absolutamente

NO MATTER WHAT YOUR JOB, MacCLATCHIE EQUIPMENT
CONTACT YOUR NEAREST MacCLATCHIE

MacCLATCHIE

COMPTON, CALIFORNIA ★ HOUSTON, TEXAS ★ EXPORT

formance PRODUCTS

mínimo. Se ofrece en modelos de 750, 1500 y 3000 libras de presión, en una gran variedad de tamaños.

10. IMPEDIDOR DE EXPLOSION 5 en 1

El impedidor de explosión 5 en 1 es accionado mediante el movimiento de una válvula de estrangulación—obturando cualquiera porción de la columna, sin consideración a tamaño o forma, en cincuenta segundos o menos. Como ni la arena ni el lodo pueden perturbar su funcionamiento, ofrece una acción positiva. Ningún otro impedidor ofrece las ventajas del presente, que son las siguientes: Adaptabilidad a tapar u obturar diferentes tamaños; Velocidad fenomenal; Operación positiva; Sin ningún cambio en empaquetadura, el impedidor de explosión MacClatchie 5 en 1 obtura cualquiera parte de la columna, en tubo de perforación, kelly, collar de perforación, tubo de herramienta o collar de tubo.

11. CABEZA DE CEMENTO DE RAPIDO CAMBIO

Esta cabeza de cemento puede instalarse en el revestimiento o quitarse de éste, casi instantáneamente. Tiene la ventaja adicional de que la alta presión solamente ensancha el obturador con más firmeza, lo que hace que el sujetador quede más fuertemente agarrado en el revestimiento.

12. IMPEDIDOR DE EXPLOSION ROTATIVO

El impedidor de explosión rotativo, para perforación bajo cualquiera presión de lodo o de gas, resiste toda presión que se presente el los modernos trabajos de perforación. Su construcción es bien firme y tan sencilla y segura que puede resistir el servicio más severo. Se acciona con facilidad y rapidez, desde el piso de la torre, y puede girarse dia trans dia, sin que sufra particular desgaste. Se hace para todo tamaño de kelly y revestimiento.

13. RASPADOR DE PARED

Tres fresas son particularmente esenciales en un raspador depared, para que éste tenga bastante fuerza, asegure un agujero perfectamente redondo y no haya ninguna vibración o trepidación que provoque tensiones torsionales sobre el tubo de perforación.

14. ESCARIDOR ENSANCHADOR ROTATIVO

Es famosoe en todo el mundo por su sencillez y funcionamiento seguro. Es particularmente valioso para la exportación, a causa de que el desgaste del cuerpo recae sobre piezas que pueden reemplazarse económicamente. Su operación es muy sencilla y positiva.

OUTILS ECONOMISEURS D'ARGENT MacCLATCHIE

1. Les sièges profilés ont 40% de plus en surface de frappe afin d'absorber complètement le choc répété de la vanne sur son siège. Des caoutchoucs réversibles brevetés assurent un usage double sans qu'il y ait plus de frais. La "profilée" est la vanne de la plus grande vente au monde!

3. PISTONS DE POMPE WEAREVER

Leur construction brevetée absorbe toute l'usure dans les caoutchoucs, qu'on peut économiquement remplacer pour la moitié du prix d'un piston neuf.

4. CHEMISES DE POMPE "ECONOMISE-ARGENT"

Grâce à une technique de fabrication très avancée, cette chemise est rigoureusement uniforme, et son bas prix à l'achat et son coût de rechange encore plus bas font des économies marquées! Une épaisseur uniforme de paroi est maintenue en tout temps, même sur les tailles plus petites que la taille Master, ce qui réduit notablement le poids d'envoi et le transport.

5. TIGES CONIQUES SPECIALES

En acier de chemin de palier et traitées thermiquement pour un maximum de ténacité, ces tiges se signalent par un écrou de blocage breveté qui maintient le piston rigoureusement rigide. Prévues en conicité Mac-Clatchie, en conicité universelle normal ou en toute conicité de fabricant de pompes.

6. VANNE TAMPON "HYDRO-SEAL"

Des rebords à écartement de graisse assurent un joint rigoureusement étanche au fluide, et un simple tour de la vis à graisse maintient le joint et graisse complètement la vanne. Dans les modèles à haute pression on supprime la garniture compressible, et on emploie des paliers à butée à roulement à billes afin d'assurer une rotation libre dans *toutes* les conditions.

7. EXTRACTEURS DE CHEMISES DE POMPE

Une traction puissante et une emprise ferme sont ce qui distingue l'extracteur de chemises Mac-Clatchie. Il est construit robuste afin de sortir les chemises les plus coincées et est prévu en une gamme complète de tailles. Spécifier à la commande.

8. "TETE DE CHAT" GEAROMATIC

A démultiplication de 2/1 ce groupe robuste donne une traction double à moitre de vitesse d'arbre de câble. Il a un dispositif de sûreté inviolable qui permet un tour *seulement* par traction—d'ou plus de danger de câbles sals.

9. ROBINET-VANNE PERFECTION

Un nouveau type de robinet-vanne à ouverture et graissage automatiques qui donne un long service indéréglable avec un minimum absolu de frais d'entretien. Prévu en modèles à pression de 750, 1500 et 3000 lbs., vaste gamme de tailles.

10. LE PARE-ECLATEMENT 5 EN 1

Le pare-éclatement 5 en 1 est manoeuvré en tournant une soupape papillon—bourrant toute portion de la colonne quelle qu'en soit la forme ou la taille en 50 secondes ou moins. Etant donné que le sable ou la boue ne peut pas gêner sa fonction, il a un fonctionnement sûr. Dans aucun autre équipement trouvet-on les caractéristiques suivantes: Adaptabilité pour bourrer plusieurs tailles; Vitesse phénoménale; Fonctionnement positif; Sans aucun changement de bourrage, le pare-éclatement 5 en 1 MacClatchie peut bourrer toute partie de la colonne comme le tuyau de forage, le Kelly, le collier de forage, le tuyau d'outil ou le collier de tuyau.

11. TETE DE CIMENT A CHANGEMENT RAPIDE

Cette tête de ciment peut être posée ou enlevée du revêtement presque en un clin d'oeil. Elle a l'avantage en plus que les fortes pressions ne peuvent que serrer le bourrage encore davantage et serrer le fourreau encore plus fermement dans le revêtement.

12. PARE-ECLATEMENT ROTATIF

Le pare-éclatement rotatif, pour forage sous toute pression de boue ou de gaz, est apte à résister à toute pression rencontrée en forage moderne. Sa construction est aussi robuste et son tracé si simple qu'il résistera en usage des plus durs. Manoeuvré rapidement et commodément depuis le plancher de tour de sondage, on peut le faire tourner jour après jour sans usure marquée. Il est prévu pour toutes les tailles de Kellys et de revêtements.

13. RACLEUR DE PAROIS

Trois lames sont particulièrement essentielles sur un racleur de parois aux fins d'assurer une plus grande force, de garantir un trou bien juste, et pour éliminer les efforts de vibration et de torsion sur le tuyau de forage.

14. SOUS-ALESEUR ROTATIF

Connu dans le monde entier pour sa simplicité et son fonctionnement indéréglable, il est surtout indiqué pour les exploitants de l'étranger, car l'usure sur le corps est reportée sur les pièces renouvelables. Sa manouvre est des plus simples et positive!

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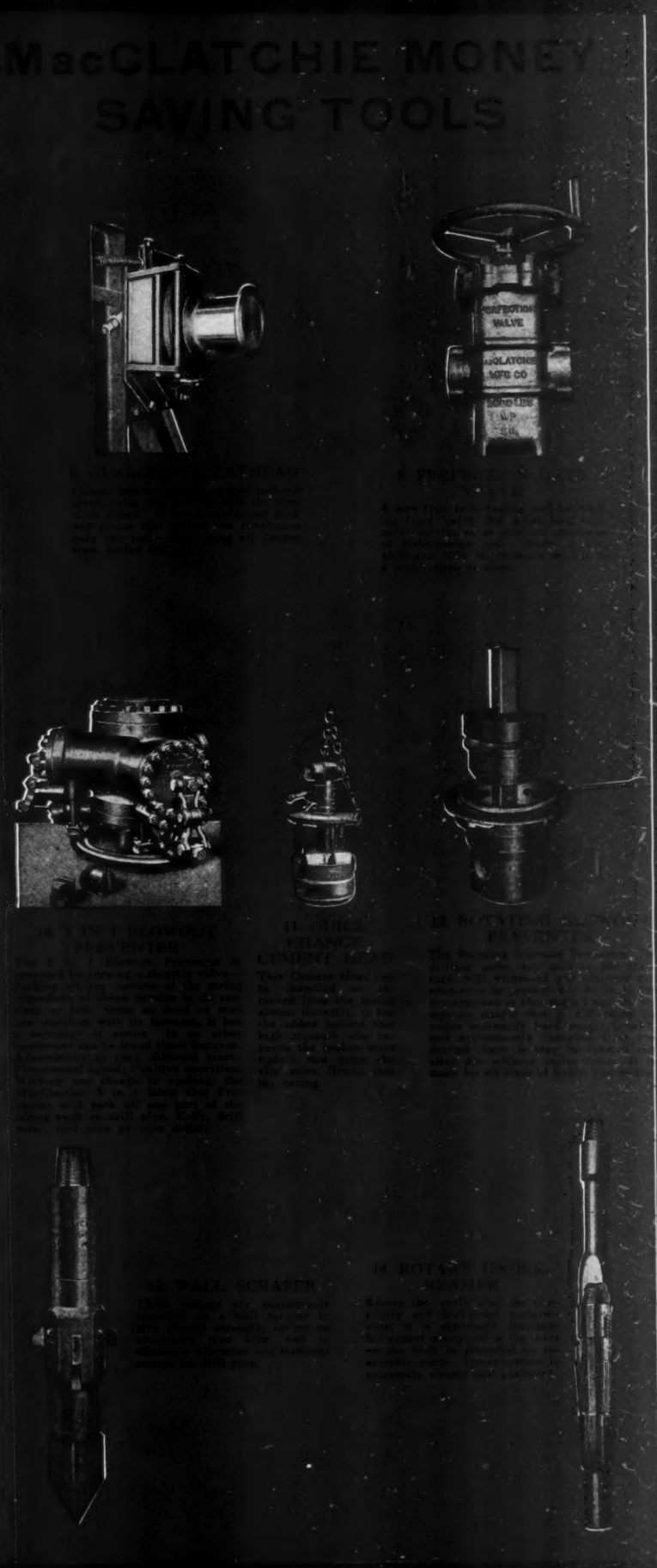
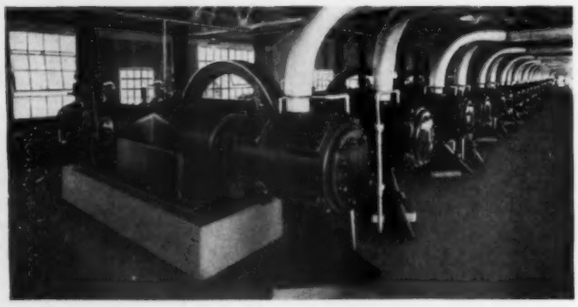


MANUFACTURING COMPANY

GEORGE R. WOODS, 17 BATTERY PLACE, NEW YORK, N. Y.

CLARK BROS. COMPANY

Export Office: 30 Rockefeller Plaza, New York. Midcontinent: Tulsa, Okla., Houston and Dallas, Texas. West Coast: Smith-Booth-Usher.



CLARK Type HS Compressors

CLARK TYPE HS COMPRESSORS

CLARK HS Gas Engine Driven Compressors, with CLARK Super-2-Cycle Fuel Injection, offer the exclusive CLARK advantage of 2-Cycle simplicity combined with 4-Cycle efficiency. In world-wide use for 24-hour service where skilled mechanics not available. Sizes: Single Engine—60, 70, 100 and 125 B. H. P.; Twin—120, 140, 200 and 250 B. H. P. Application: Natural Gasoline Plants, Vapor Recovery, Repressuring Plants, Gas and Air Lift, Refrigeration, Air Compressors, Gas Booster Stations, Compression Processes Requiring Close Control.

COMPRESSEURS CLARK TYPE HS

Les compresseurs à moteur à gaz CLARK HS, avec super-injection à 2 temps de carburant CLARK, offrent l'avantage exclusif à CLARK de la simplicité du 2 temps combinée au rendement du 4 temps. D'un emploi général au monde pour service de 24 heures là où ne dispose pas de mécaniciens spécialisés. Tailles: Moteur simple—60, 70, 100 et 125 H.P. au frein; Jumelé—120, 140, 200 et 250 H.P. au frein. Application: Installations d'essence naturelle, Récupération de vapeurs. Groupes de remise sous pression, Levage de gaz et air, Réfrigération, Compresseurs à air, Stations de renfort à gaz, Procédés de compression demandant un contrôle serré.

COMPRESORES CLARK, TIPO HS

Los compresores CLARK HS, accionados por motor de gas, con inyección de especial tipo CLARK de dos ciclos para el combustible, ofrecen las exclusivas ventajas CLARK de la sencillez del tipo de dos ciclos, en combinación con el rendimiento del tipo de cuatro ciclos. En todas partes del mundo se emplean en servicios de 24 horas, no exigiendo la atención de mecánicos expertos. Tamaños: con motor sencillo—60, 70, 100 y 125 c. de f. ingleses; con motor gemelo—120, 140, 200 y 250 c. de f. ingleses. Aplicaciones: instalaciones de gasolina natural, recuperación de vapores, instalaciones de recompresión, levantamiento por gas o aire, refrigeración, compresores de aire, estaciones de amplificación de gas, procedimientos de compresión que requieran un gobierno exacto.

CLARK STEAM ENGINE DRIVEN COMPRESSORS

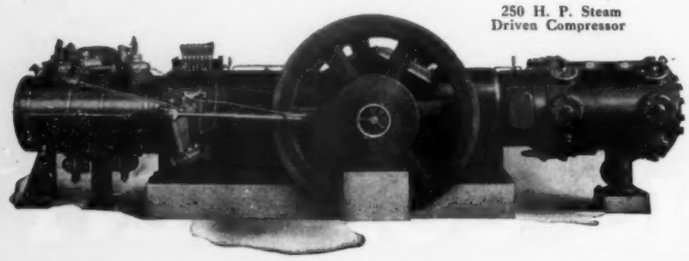
CLARK Steam-Driven Compressors are designed for compressing Hydrocarbon gases, Ammonia, Carbon Dioxide, and for special process work. Sizes from 100 to 600 H. P. These units assure maximum steam economy and can be used with either Uniflow or Counter-flow steam engines. Construction: Heavy frame and running gear; Force-feed lubrication; Overspeed governor; Quarter-box main bearings; Control either by hand-operated cut-off or automatic speed control by variable cut-off to control pressure, volume or temperature.

COMPRESSEURS A MACHINE A VAPEUR CLARK

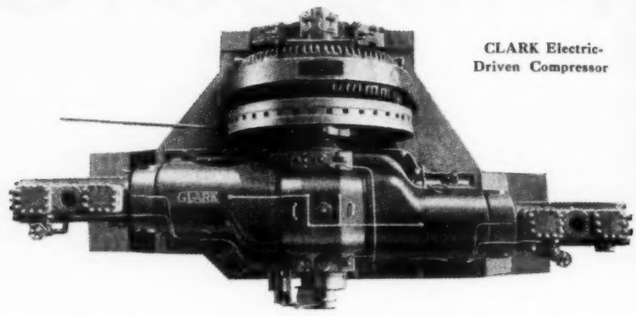
Les compresseurs à machine à vapeur CLARK sont prévus pour comprimer les gaz hydrocarbures, l'ammoniac, le gaz carbonique, et pour traitements spéciaux. Tailles allant de 100 à 600 H.P. Ce groupes assurent une économie maximum en vapeur et peuvent s'employer avec machines à vapeur soit du type dit unicourant, soit du type contre-courant. Construction: Bâti et train roulant robustes; graissage sous pression; régulateur d'excès de vitesse; paliers de vilebrequin moteur à quart de cage; contrôle soit par commande d'admission à main ou contrôle automatique de vitesse par admission variable pour contrôler la pression, le volume ou la température.

COMPRESORES CLARK ACCIONADOS POR MOTOR DE VAPOR

Los compresores CLARK accionados por motor de vapor ha sido proyectados para la compresión de gases de hidrocarburos, amoniaco, bióxido de carbono, y para tratamientos especiales. Tamaños de 100 a 600 c. de f. Estos compresores aseguran máxima economía de vapor y pueden emplearse con motores de vapor de corriente en un solo sentido o de corriente contraria. Construcción: bastidor y mecanismo en general de firme construcción; lubricación bajo presión; regulador de velocidad; cojinetes de cigüeñal de motor en cuarto de jaula; control por gobierno manual o por gobierno automático de velocidad, mediante admisión variable para regular la presión el volúmen y temperatura.



250 H. P. Steam Driven Compressor



CLARK Electric-Driven Compressor

CLARK ELECTRIC-DRIVEN COMPRESSORS

CLARK Balanced Opposed Electric-Driven Compressors are built in sizes from 50 to 1250 H. P. Application: Gas or Air Lift; Natural Gasoline and Vapor Recovery Plants; Refrigeration; Special processes requiring close control of pressure or volume. Features: Two-throw Crankshaft with 180-degree cranks balances reciprocating forces, eliminates vibration; Reduced main-bearing load; CLARK Strip Valves; Built-in by-pass; Force-feed Lubrication; Small foundation required; Adaptable to firewall construction.

COMPRESSEURS ELECTRIQUES CLARK

Les compresseurs électriques CLARK, opposés et équilibrés, sont prévus en grandeurs de 50 à 1250 H.P. Application: Levage de gaz ou air; installations de récupération d'essence naturelle et de vapeurs; réfrigération; procédés spéciaux demandant un réglage serré de la pression ou du volume. Caractéristiques: Vilebrequin à double coude avec coudes à 180 degrés qui équilibre les forces alternatives et supprime les vibrations; charge réduite sur les paliers de vilebrequin; soupapes à languette CLARK; dérivation à demeure; graissage sous pression; un petit socle suffit; adaptable à la construction de murs de foyer.

COMPRESORES CLARK ACCIONADOS POR MOTOR ELECTRICO

Los compresores CLARK opuestos y equilibrados, accionados por motor eléctrico, se construyen en tamaños de 50 a 1250 c. de f. Aplicaciones: levantamiento por gas o aire, instalaciones de gasolina natural y de recuperación de vapores, refrigeración, procedimientos especiales que requieran un gobierno exacto de la presión o del volúmen. Características: cigüeñal de doble codo, con codos a 180 grados, para equilibrar las fuerzas alternativas y suprimir la vibración; menor carga sobre los cojinetes del cigüeñal; válvulas de lengüeta CLARK; derivación integral; lubricación bajo presión; requiere una base pequeña.

CLARK HEAVY-DUTY VERTICAL ENGINES

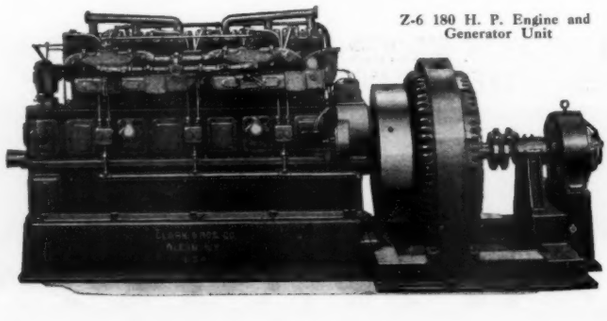
CLARK Heavy-Duty Vertical Engines are widely used in the Oil Industry for generation of electric power, main line pumping, driving hot oil pumps, industrial drive, driving large pumping powers, drilling, etc. 4, 6 and 8-Cylinder sizes—90 to 300 H. P. Features: Modern "L" Head design; Full pressure lubrication; Oil cooled and filtered; Air starting on all cylinders; Roller-Bearing Cam shaft; Convertible to Diesel.

MOTEURS VERTICAUX CLARK DE SERVICE DUR

Les moteurs verticaux CLARK de service dur sont très répandus dans l'industrie du pétrole pour la génération de force électrique, le pompage de canalisations principales, l'entrainement de pompes à pétroles chauds, la transmission dans l'industrie, l'entrainement de grands groupes de pompage, le forage, etc. Types à 4, 6 et 8 cylindres—90 à 300 H.P. Caractéristiques: Culasse type moderne en "L"; graissage sous pression total; huile refroidie et filtrée; démarrage pneumatique sur tous les cylindres; arbre à cames sur roulements à rouleaux; transformable en Diesel.

MOTORES VERTICALES CLARK DE TRABAJO PESADO

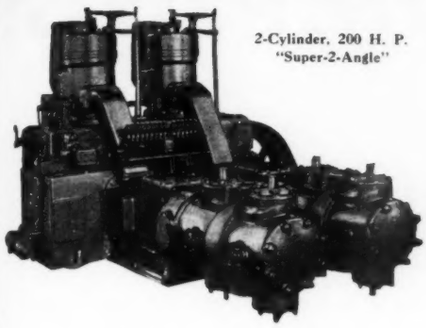
Los motores verticales CLARK de trabajo pesado se emplean mucho en la industria del petróleo, para la generación de fuerza eléctrica, bombeo de tubería, accionamiento de bombas de petróleo caliente, propulsiones industriales, funcionamiento de grandes bombas, trabajos de perforación, etc. En modelos de 4, de 6 y de 8 cilindros, y en potencia de 90 a 300 c. de f. Características: tipo de válvulas en un solo lado; lubricación bajo presión, aceite enfriado y filtrado; arranque mediante fuerza neumática en todos los cilindros; árbol de levas en cojinetes de rodillos; conversión a tipo diésel.



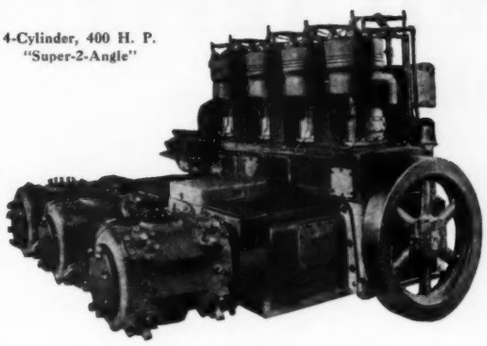
Z-6 180 H. P. Engine and Generator Unit

OLEAN, NEW YORK, U. S. A.

2001 Santa Fe Av., Los Angeles. Foreign: 72 Turnmill St., E. C. 1, London; 4 Str. General Poetas, Bucharest, Roumania



2-Cylinder, 200 H. P.
"Super-2-Angle"



4-Cylinder, 400 H. P.
"Super-2-Angle"

CLARK "SUPER-2-CYCLE" RIGHT-ANGLE COMPRESSOR

The CLARK "Super-2-Cycle" Right-Angle Compressor has proved to be one of the outstanding advances of recent years, in compressor design, introducing a number of important economies in compressor plant installation and operation. Like all CLARK gas-engine driven compressors, the "Super-2-Angle" offers CLARK Super-2-Cycle Fuel Injection, securing 4-Cycle efficiency with 2-Cycle simplicity. In addition, it incorporates all of the desirable features of both the vertical gas engine and the horizontal compressor. The unit consists of a single row of power cylinders set at right angles to the horizontal compressor cylinders.

Equalling any other type of compressor in power and efficiency, this compressor effects 5 substantial savings, as follows: 1. Cuts transportation and erection costs, being shipped assembled; 2. Reduces foundation requirements; 3. Requires smaller floor space, smaller building; 4. Saves fuel, due to CLARK Super-2-Cycle Fuel Injection; 5. Reduces maintenance cost, due to extreme simplicity.

Application: Natural Gasoline, Vapor Recovery, or Repressuring Plants; Gas and Air Lift; Refrigeration; Gas Booster Stations, etc.

RANGE OF SIZES

Gas Engines Cylinders	14" Stroke		—300 R. P. M.		Diesel Engines Cylinders	14" Stroke	
	Bore	B. H. P.	Bore	B. H. P.		Bore	B. H. P.
2	12½"	150	14"	200	2	12½"	145
3	12½"	225	14"	300	3	12½"	220
4			14"	400	4	12½"	300
6	12½"	450	14"	600	6	12½"	440

COMPRESSEUR A ANGLE DROIT CLARK "SUPER-2-TEMPS"

Le compresseur à angle droit CLARK dit "Super-2-temps" a fait ses preuves comme un des progrès les plus décisifs de ces dernières années en type de compresseur, ayant innové un bon nombre d'économies importantes en installation et conduite de groupe compresseur. De même que tous les compresseurs à moteur à gaz CLARK, le "Super-2-Angle" offre l'injection super-2-temps de carburant du type CLARK, assurant le rendement du 4 temps et la simplicité du 2 temps. En outre, il a toutes les caractéristiques désirables du moteur à gaz vertical et du compresseur horizontal. Ce groupe consiste d'une rangée unique de cylindres moteurs disposés à angles droits par rapport aux cylindres du compresseur horizontal.

Valant tout autre type de compresseur pour la puissance et le rendement, ce compresseur réalise 5 économies marquées, à savoir: 1. Réduit les frais de transport et de montage, étant expédié tout monté; 2. Réduit les besoins de fondation; 3. Demande moins de place, un bâtiment plus petit; 4. Economise en carburant, grâce à l'injection super-2-temps re carburant du type CLARK; 5. Diminue les frais d'entretien, grâce à son extrême simplicité.

Applications: Installations de récupération d'essence naturelle, de vapeurs, ou de remise sous pression; Levage de gaz et d'air; Réfrigération; Stations re renfort à gaz, etc.

GAMME DE GRANDEURS

Moteurs à gaz Cylindres	Course 14 pouces		—300 t/m		Moteurs Diesel Cylindres	Course 14 pouces	
	Alésage	H.P. au frein	Alésage	H.P. au frein		Alésage	H.P. au frein
2	12½"	150	14"	200	2	12½"	145
3	12½"	225	14"	300	3	12½"	220
4			14"	400	4	12½"	300
6	12½"	450	14"	600	6	12½"	440

COMPRESOR CLARK "SUPER DE 2 CICLOS" EN ANGULO RECTO

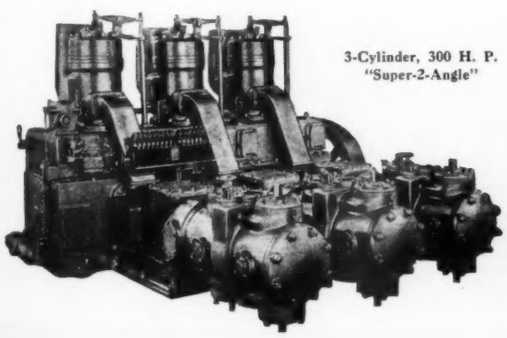
El compresor CLARK "Super de 2 ciclos" en ángulo recto, ha resultado ser uno de los más importantes progresos de estos últimos años, en materia de compresor, pues ha introducido numerosas importantes economías en la instalación y operación de compresores. Como todos los compresores CLARK accionados por motor de gas, el presente modelo en ángulo recto ofrece el sistema de inyección de combustible "super de dos ciclos," que combina la sencillez del tipo de dos ciclos o tiempos con el gran rendimiento del tipo de cuatro ciclos o tiempos. Por otra parte, comprende todos los rasgos importantes y convenientes del motor vertical de gas y del compresor horizontal. El grupo consta de una sola serie de cilindros de fuerza colocados en ángulo recto en relación con los cilindros del compresor horizontal.

Igualándose a cualquier otro tipo de compresor, en fuerza y en rendimiento, este compresor efectúa cinco importantes ahorros, como siguen: 1. Reduce los gastos de transporte y de instalación, pues se embarca completamente armado o montado; 2. Reduce los requisitos de base o cimiento; 3. Requiere menor superficie de piso y un menor edificio; 4. Ahorra combustible, debido al sistema de inyección de combustible CLARK super de dos ciclos; 5. Reduce los gastos de conservación, debido a su extraordinaria sencillez.

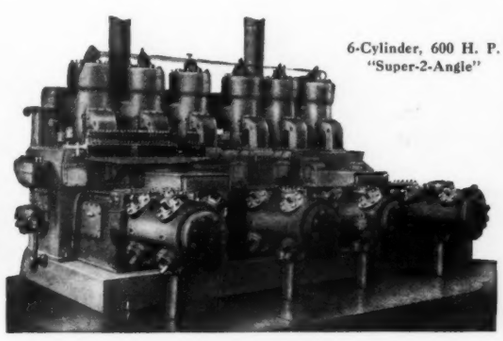
Aplicaciones: Gasolina natural; recuperación de vapores, instalaciones de recompresión; levantamiento por gas o agua; refrigeración; estaciones de amplificación de gas, etc.

ESCALA DE TAMANOS

Motores de gas Cilindros	Carrera de émb. 14"		—300 R.P.M.		Motores Diésel Cilindros	Carrera de émb. 14"	
	Diám. int. de cilindro	C. de F. ingl.	Diám. int. de cilindro	C. de F. ingl.		Diám. int. de cilindro	C. de F. ingl.
2	12½"	150	14"	200	2	12½"	145
3	12½"	225	14"	300	3	12½"	220
4			14"	400	4	12½"	300
6	12½"	450	14"	600	6	12½"	440

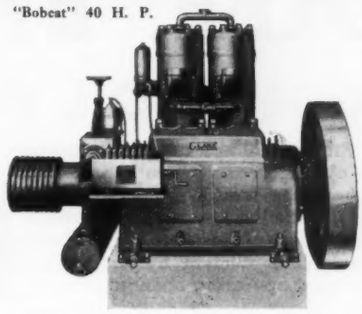


3-Cylinder, 300 H. P.
"Super-2-Angle"



6-Cylinder, 600 H. P.
"Super-2-Angle"

"Bobcat" 40 H. P.



VERTICAL PUMPING ENGINE

The CLARK "Bobcat" and "Bobkitten" Vertical Gas Pumping Engines are designed especially for oil well pumping. Built to operate out of doors, they save the expense of a belt house. With vertical design and short belt they also save about 50% in floor space and 55% in foundation costs. Introduced more than 3 years ago, these engines have proved their dependability. Features: 2-Cycle dependability; Medium-speed, long life; Smooth, even torque; Roller main bearings; No outboard bearing; No valves in combustion chamber; Light weight, easily installed.

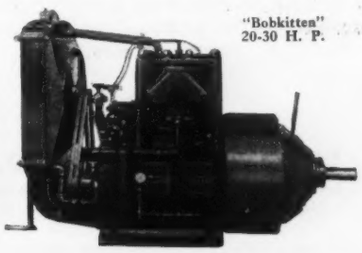
MOTEUR DE POMPAGE VERTICAL

Les moteurs de pompage à gaz verticaux "Bobcat" et "Bobkitten" de CLARK sont étudiés spécialement pour pompage de puits de petrole. Prévus pour fonctionner à l'extérieur, ils économisent les frais d'un couvre-courroie. De type vertical et à courte courroie, ils économisent aussi environ 50% d'espace et 55% en frais de fondations. Lancés il y a plus de 3 ans, ces moteurs ont fait leurs preuves en service. Caractéristiques: sûreté de fonctionnement du 2 temps; vitesse moyenne, longue vie utile; couple égal et régulier; paliers de vilebrequin à rouleaux; pas de palier extérieur; pas de soupapes dans la chambre de combustion; poids réduit et installation facile.

MAQUINA BOMBEADORA VERTICAL

Las máquinas bombeadoras verticales CLARK, modelos "Bobcat" y "Bobkitten" especiales para gas, han sido construídas para servicio en pozos de petróleo. Están preparadas para funcionar al aire libre, y ahorran el gasto de una caja de correa. Debido a su estilo vertical y correaje corto, ahorran también como 50% de superficie de piso y como 55% del gasto de base. Introducidas hace como tres años, estas bombas han demostrado su buen funcionamiento y seguridad. Características; seguridad del tipo de dos ciclos; velocidad mediana; prolongada duración, funcionamiento suave con fuerza uniforme; cigüeñal en cojinetes de rodillos; no hay cojinete exterior; no hay válvulas en la cámara de combustión; peso liviano y fácil instalación.

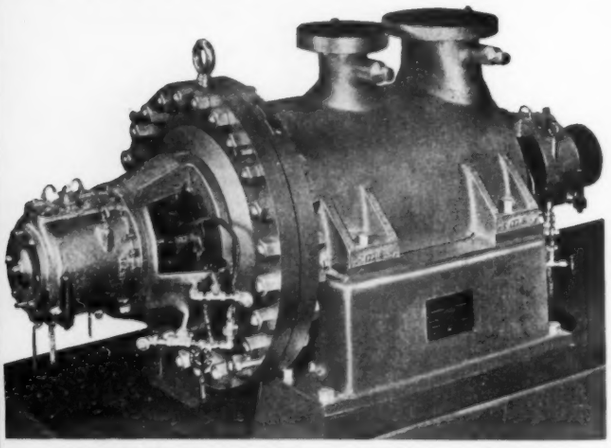
"Bobkitten"
20-30 H. P.



SAFE, EFFICIENT PUMPING

MODERN OIL PUMPS

Byron Jackson Pumps are today adopted as "standard" by an ever-increasing number of petroleum companies throughout the world. Each specific requirement—from charging hot oils, or cold light gravity propanes in the polymerization process—to that of water supply—is met by a safe and efficient Byron Jackson Pump, noted for long life and operating economy.

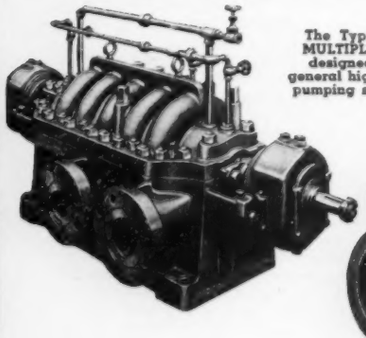


Double Case Hot Oil Charging and High Pressure Boiler Feed Pump, an almost universal choice for hot liquid pumping

PROFIT WITH THESE MODERN PUMPS

Knowledge of metallurgy and hard and corrosion-resistant surfacing materials has been so increased during the past few years that previous operating records are being amazingly exceeded today. 28,000 hours of continuous operation, on corrosive hot oils with two Byron Jackson Charging Pumps is a record recently established. That means profit in production.

Correspondence in your own language, giving all possible information as to conditions, will permit Byron Jackson Engineers to make specific recommendations.



The Type HS MULTIPLEX is designed for general high head pumping service.

(Left) Type S Pumps, with capacities from 50 g.p.m. upward, against heads up to 400 feet, fit a wide range of cold or warm liquid pumping services.

GET ALL DETAILS—complete Bulletins describing the units illustrated on this page will be furnished promptly to any oil man.

Established 1872

BYRON JACKSON CO.

Berkeley — LOS ANGELES — Bethlehem

New York — Houston — Pittsburgh — Chicago — Fort Worth

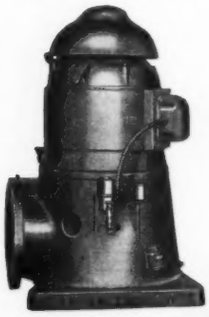
THE SUBMERSIBLE

Patented

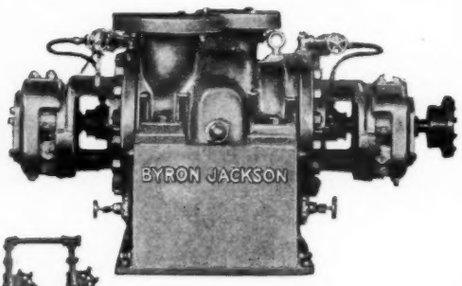
This outstanding example of Byron Jackson progress in pump design, consists of a motor which is submerged in water, and direct-connected to a deepwell turbine pump. The motor is mercury sealed in a steel case filled with a high dielectric oil, and the unit is suspended by the discharge pipe. Power is supplied through an armored cable; there is no line shaft, no inner tube and bearings; and no priming or attendance is required.

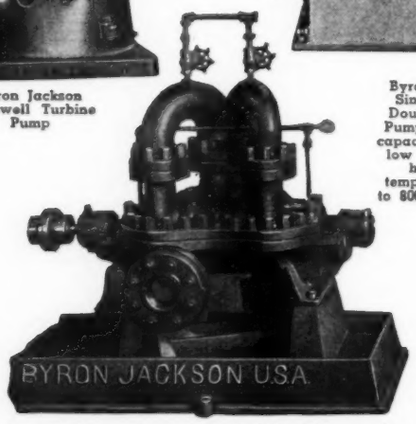
The Submersible meets every demand for pumping from small diameter bored wells and the safety provided by the submerged motor makes it ideal for refinery water supply service.

Detailed Bulletins are available upon request by any oil man.



Byron Jackson Deepwell Turbine Pump





Although designed as "O.L." (Oil Line) Pumps, the Byron Jackson Multiplex also is well suited to cold or warm oil charging service.

Byron Jackson Single Stage Double Suction Pump, for high capacities against low or medium heads, at temperatures up to 800 degrees F.

With a capacity range from 10-200 g.p.m. and head range up to 7,000 feet, the HYDROPRESS is well suited to hot and cold oil refinery service, and to oil well re-pressuring.

The direct-connected motor and pump, provide compactness and the ability to operate in any position, thus making the BILTON ideal for portable service.

Highly efficient and with modern safety features, Byron Jackson Process Pumps are suited to hot or cold pumping, where the service is mechanically or hydraulically severe.

BYRON JACKSON PUMPS

All of these modern and successful BJ OIL TOOLS, and many others, are described, illustrated and priced in the BJ Catalog, sent upon request of any oil man, and in the 1938 Composite Catalog.

1. The one-piece, heat-treated bodies of BJ Rod Elevators are equipped with latches that are convenient to operate from front or rear. 2. The "30" Tubing Hook has a safe "locking-arm" and is suited to use in short derricks. 3. The open locking-arm serves to pick up the elevator bail. 4. The "Full Circle" Rod Elevator fits around full circumference of the rod. 5. Hooks for 50-ton and 75-ton loads have enclosed springs, and the safe BJ Locking-arm. 6. For safe, fast handling of drill pipe or casing, specify BJ Extra Heavy Rotary & Casing Tong. 7. The Shortype "C" Tubing Catcher is easy to run, and extremely low in price. 8. The "Surestop" Tubing Catcher with Anchor for setting at any desired point. 9 & 10. The cutting edge of the small-diameter pilot bit is from 6 to 10 feet below the upper reaming cutters, on both Bit and Underreamer. By making the pilot bit longer than the drilling stroke, fast, vertical hole is drilled at lowest cost. 11. The light weight Open End Tong is easily applied on the tubing, and remains in position. 12. The Snapon Tong locks around the tubing, and is strong and safe for large size tubing. 13. The Perfection Underreamer has been used for years in every country for successful cable tool underreaming. 14. The BJ Type "G" Elevator fits external upset drill pipe of 18% taper or more, without using lifting plugs. 15. Heat-treated body, and safe design make the Type "A" Elevator an outstanding favorite.

2. Tubing Hook for 30-ton loads.

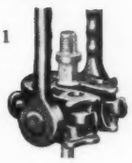
2. Crochet de tubage pour charges de 30 tonnes.

2. Gancho de tubería para cargas de 30 toneladas.

3. Handy for picking up the rod elevator.

3. Pratique pour ramasser l'élévateur à tige.

3. Muy práctico para levantar el elevador de varilla.

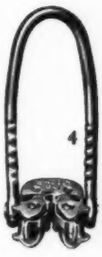


1. BJ Rod Elevators are operated from front or rear.

1. Les élévateurs à tiges BJ se manoeuvrent de devant ou de derrière.

20 Rod Hook

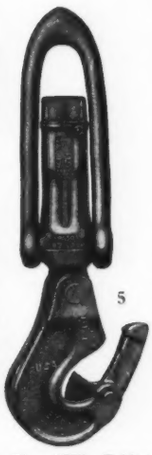
1. Los elevadores de varillas BJ se maniobran por delante o por detrás



4. The "Full Circle" Rod Elevator entirely encircles the rod.

4. L'élévateur à tige "Full Circle" entoure complètement la tige.

4. El elevador de varilla de tipo de "círculo completo" rodea por completo a la varilla.



5. The "75" Tubing Hook has enclosed relief springs.

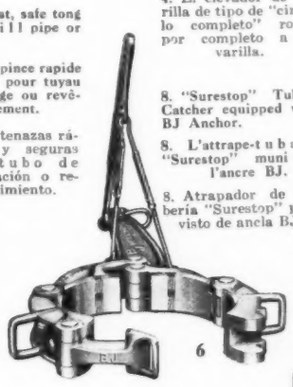
5. Le crochet de tubage "75" a des ressorts amortisseurs enfermés.

5. El gancho "75" para tubería tiene resortes amortiguadores tapados

6. A fast, safe tong for drill pipe or casing.

6. Une pince rapide et sûre pour tuyau de forage ou revêtement.

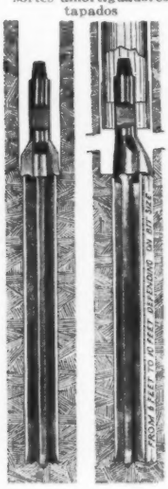
6. Las tenazas rápidas y seguras para tubo de perforación o revestimiento.



8. "Surestop" Tubing Catcher equipped with BJ Anchor.

8. L'attrape-tubage "Surestop" muni de l'ancre BJ.

8. Atrapador de tubería "Surestop" provisto de ancla BJ.



7. The "Shortype C" Tubing Catcher.

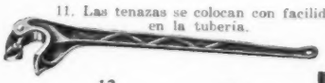
7. L'attrape-tubage "Type court C."

7. El atrapador de tubería, tipo corto "C"

11. Tong is easily placed on tubing.

11. La pince se place facilement sur le tubage.

11. Las tenazas se colocan con facilidad en la tubería.



9-10. New BJ Cable Tool Bit and Underreamer.

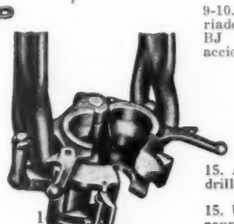
9-10. Nouveau trépan à outil sur câble et sous-aléseur BJ.

9-10. Barrena y escariador ensanchador BJ de nuevo tipo, accionada por cable.

12. This tong locks around the tubing.

12. Cette pince se bloque autour de tubage.

12. Estas tenazas se cierran alrrededor de la tubería.



15. A safe elevator for drill pipe or tubing.

15. Un élévateur sûr pour tuyau de forage ou tubage.

15. Un elevador seguro para tubo de perforación o tubería.

13. Perfection Cable Tool Underreamer.

13. Sous-aléseur à outil sur câble Perfection.

13. Escariador ensanchador Perfection accionado por cable.

14. Elevator for External Upset Drill pipe.

14. Elévateur pour tuyau de forage renforcé extérieurement.

14. Elevador para tubo de perforación reforzada exteriormente por recalcadura.

Tous ces OUTILS PETROLIERS BJ modernes et très prisés, et bien d'autres, sont décrits, illustrés et cotés dans le catalogue BJ, envoyé sur demande à tout opérateur pétrolier, ainsi que dans le catalogue combinaison de 1938.

1. Les élévateurs à tiges BJ ont des corps d'une seule pièce, traités thermiquement, et sont munis de loquets bien placés pour la manoeuvre de devant ou de derrière.—2. Le crochet de tubage "30" a un "bras de verrouillage" de sûreté et convient à l'emploi sur courtes tours de sondage.—3. Le bras de verrouillage ouvert sert à ramasser l'écopeur élévateur. — 4. L'élévateur à tige dit "Full Circle" s'adapte tout autour de la périphérie de la tige. — 5. Les crochets pour charges de 50 tonnes et 75 tonnes ont des ressorts enfermés et le bras de verrouillage de sûreté BJ. — 6. Pour une manutention sûre et rapide de tuyau de forêt ou de revêtement, bien spécifier la pince extra-forte de rotatif et de revêtement.—7. L'attrape-tubage du type court "C" est facile à descendre et très bon marché. — 8. L'attrape-tubage "Surestop" avec ancre qu'on peut amener à tout point désiré.—9 & 10. L'arête tranchante du trépan pilote de faible diamètre est de 6 à 10 pieds endessous des fraises d'alésage supérieures tant sur le trépan que sur le sous-aléseur. En faisant le trépan pilote plus long que la course de forage, on fore rapidement un trou vertical avec minimum de frais. —11. La pince à bout ouvert et de poids léger s'applique facilement sur le tubage et reste en place.—12. La pince "Snapon" se bloque autour du tubage, et est forte et sûre pour tubage de fort calibre.—13. Le sous-aléseur Perfection s'emploie depuis des années dans tous les pays pour effectuer avec succès le sous-alésage à outil sur câble. — 14.L'élévateur BJ de type "G" s'adapte à du tuyau de forage renforcé extérieurement de 18% de conicité ou plus sans devoir employer de tampons de levage. — 15. Un corps traité thermiquement et un tracé de sûreté font de l'élévateur de type "A" un type très en vogue.

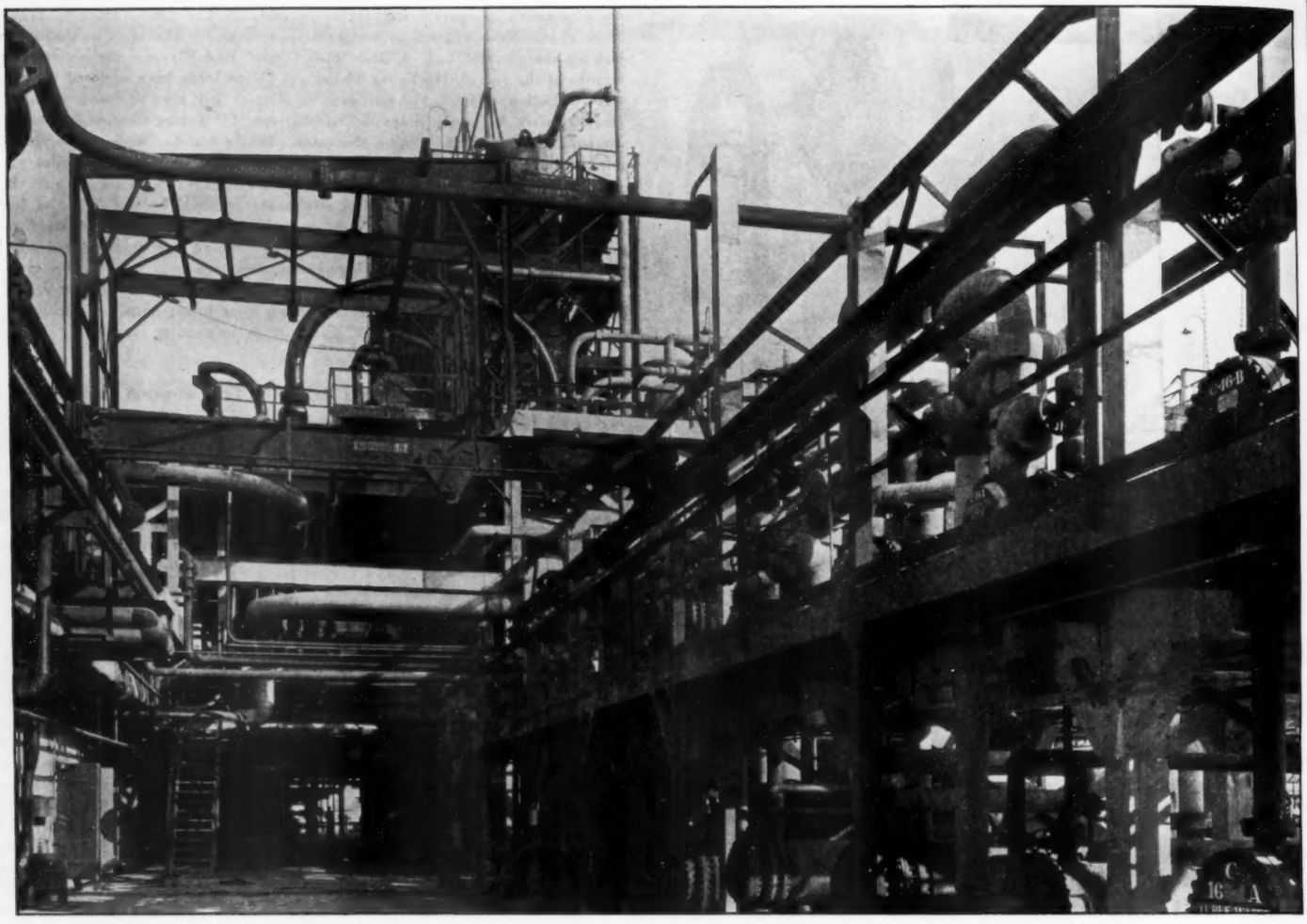
Todas estas modernas y conocidas HERRAMIENTAS BJ PARA TRABAJOS PETROLEROS y muchas otras de esta marca, se describen, ilustran y cotizan en el catálogo BJ, que gustosamente enviaremos a solicitud a cualquier interesado que lo pida, lo mismo que en el catálogo de combinación de 1938.

1. Los elevadores de varillas BJ tienen cuerpos de una sola pieza, tratados térmicamente, y llevan pestillos muy bien colocados para la maniobra por delante o por detrás.—2. El gancho de tubo "30" tiene un brazo de "cierre" de seguridad y se adapta idealmente a empleo en torres de perforación bajas.—3. El brazo de cierre abierto sirve para levantar el asa del elevador.—4. El elevador de varilla de tipo "círculo completo," ajusta alrededor de la completa circunferencia de la varilla. — 5. Los ganchos para cargas de 50 y 75 toneladas tienen resortes tapados y el brazo de cierre de seguridad BJ.— 6. Para el manejo rápido y seguro de tubo de perforación o revestimiento, especifique las tenzas extra fuertes BJ para tubo de perforación rotativa y revestimiento. — 7. El atrapador de tubería de tipo corto "C" es muy fácil de manejar y muy económico en precio.—8. El atrapador de tubería "Surestop" con ancla, para su colocación en cualquier punto deseado. —9. y 10. El borde cortante de la barrera guiadora de pequeño diámetro está de 6 a 10 pies debajo de las fresas del escariador de arriba, tanto en la barrena como en el escariador ensanchador. Haciendo la barrena guiadora más larga que la carrera de la perforación, se perfora rápidamente un agujero vertical al menor costo posible.—11. Las tenazas de extremo abierto, de peso liviano, se aplica con facilidad a la tubería, produciendo una retención segura.—12. Las tenazas "Snapon" se cierran alrrededor de la tubería y resulta muy firme y segura para tubería de gran tamaño. — 13. El escariador ensanchador Perfection se ha empleado, desde hace años en todo país petrolero, con mucho éxito, en trabajos de escariar, con la ayuda de cable. — 14. El elevador BJ de tipo "G" se adapta a tubo de perforación reforzado por recalcadura de 18% de conicidad o más, sin necesidad de emplear tapones de levantamiento. — 15. Cuerpo tratado térmicamente y tipo de seguridad, hacen del elevador de tipo "A" un favorito en todas partes.

BYRON JACKSON CO.

FORT WORTH • LOS ANGELES • NEW YORK

DRILLING & PRODUCTION TOOLS



Portion of the 30,000-bbl. combination unit operating in the Pan American Petroleum Co. plant at Texas City, Tex.
Portion du groupe combinaison de 30.000 barils en service dans l'usine de la Pan American Petroleum Co. a Texas City, Tex.
Parte de la instalacion de combinacion, con capacidad para 30.000 barriles, incluida en el gran establecimiento de la Pan American Petroleum Co. en Texas City, Tex., E.U.A.

fractions (reforming), and skim off a predetermined quantity of straightrun gasoline, kerosene, distillates, gas oil, and wax distillate.

Combination units capable of doing this are in operation. In the past year such units were installed at refineries located in California, Mid-Continent, Gulf Coast and East Coast refining areas in the United States and in several foreign countries. The relatively large throughput needed to operate these units most economically has limited their use to the larger refineries.

A single combination unit capable of processing 36,000 bbls., of crude oil daily was in operation over the past year and more recently several units have been completed and placed in operation with charging capacities of from 15,000 to 24,000 bbls. Also, several units of 5,000 bbls., daily capacity have been in operation to prove that the refinery of average size may justify this type of distillation equipment.

A more recent development combines polymerization with skimming and cracking. The installation is now being made and has been designed to process 22,000 bbls., of crude daily.

AIRPLANE MOTOR FUELS

This tendency to build motor fuels of abnormally high octane value has been the direct result of aircraft motor designers demanding fuels of this

Des groupes-combinaisons permettant l'ensemble de ces opérations sont déjà en service. L'an dernier, il en a été installé dans des raffineries de Californie, du Centre, de la Côte du Golfe du Mexique et da la Côte Est des Etats-Unis, ainsi que dans plusieurs pays étrangers. L'étendue relativement grande qu'il faut pour obtenir un rendement vraiment économique de ces groupes en a limité l'emploi aux plus grandes raffineries.

Un groupe-combinaison unique, pouvant traiter 36.000 barils de pétrole brut par jour, a été en service tout l'an dernier, et plus récemment on a installé et mis en service plusieurs groupes analogues de capacités de chargement allant de 15.000 à 24.000 barils. En outre, plusieurs groupes d'une capacité de 5.000 barils par jour ont été mis en service pour prouver que la raffinerie moyenne peut avoir intérêt à utiliser ce type de matériel de distillation.

Un type plus récent combine la polimérisation avec la distillation non poussée et le cracking. Cette installation est en cours et prévoit le traitement de 22.000 barils de pétrole brut par jour.

CARBURANTS MOTEURS POUR AVIONS

Cette tendance à préparer des carburants moteurs d'un indice octane très fort a été le résultat direct de ce que les constructeurs de moteurs d'aviation ont réclamé des carburants de ce type. Année après année, ces constructeurs ont réalisé des moteurs ayant des rapports de compression de plus en plus forts, et maintenant que de nombreux pays cherchent à se dépasser les uns les autres pour le nombre d'esquadrilles

predeterminada de gasolina de esencia de destilación, kerosina, destilados, aceite de gas y destilado de parafina o cera.

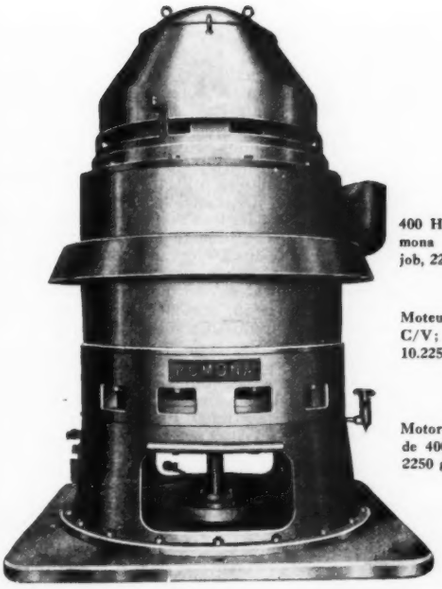
En funcionamiento hay ya instalaciones de combinación que pueden hacer todo este trabajo. Semejantes instalaciones se hicieron el año pasado en refinerías situadas en California, en la parte central, en la Costa del Golfo y en la Costa del Este, de los Estados Unidos de América, y también, en varios países del extranjero. El abastecimiento contínuo, comparativamente grande, que se necesita para la operación de estas instalaciones, de una manera muy económica, ha limitado su empleo a las refinerías más grandes.

Una sola instalación con capacidad para convertir 36.000 barriles de petróleo crudo, al día, se mantuvo en contínua operación el año pasado, y más recientemente se han terminado y puesto a trabajar varias instalaciones con capacidades de carga de 15.000 a 24.000 barriles diarios. También han estado en operación varias instalaciones con capacidad para 5.000 barriles diarios, lo que demuestra que una refinería de tamaño promedio puede justificar este tipo de equipo de destilación.

Un desarrollo más reciente combina la polimerización con la destilación sin presión y "cracking." Esta instalación, que acaba de hacerse, está destinada a manejar 22.000 barriles de petróleo crudo al día.

COMBUSTIBLES PARA MOTORES DE AEROPLANOS

La tendencia a la producción de combustibles de motor con un valor de octano anormalmente alto ha sido el resultado directo de la demanda, por parte de los fabricantes de motores de aero-



400 H.P., 1000 r.p.m. Pomona synchronous motor job, 2250 g.p.m., total 530'.

●

Moteur synchrone de 400 C/V; 1000 t/m; élevant 10.225 litres de 162 mètres par minute.

●

Motor sincrónico Pomona de 400 H.P., 1000 r.p.m., 2250 g.p.m., altura total de 530 pies.

ALL THE OIL WORLD LOOKS TO POMONA

Wherever water must be handled—as a utility or a nuisance, for continuous or intermittent service—Pomona Turbine Pumps are preferred by oil men for economical operation and unfailing dependability. The international preference for Pomona Pumps has made them the largest selling turbine pumps in the world and has made possible the maintenance of the quickest, most reliable service organization in the industry. You can't go wrong on the leader.

POURQUOI LES PÉTROLIERS PRÉFÉRE POMONAS

Partout où la question de l'eau se pose, soit pour capter ses bienfaits, soit pour eviter ses mefaits—pour une travail continû ou alternative—les Pompes Pomona sont préférées pour leur économie d'operation et l'infaillibilite de leur fonctionnement.

Leur qualité a imposée les Pompes Pomona dans le monde entier. Leur service d'entretien est en tous points du globe:—le plus important, le plus rapide et le plus accessible de l'industrie des pompes turbines.

Pour bien choisir, choisissez une Pompe Pomona.

TODOS AQUELLOS EN EL NEGOCIO DEL ACEITE DEPENDEN EN LA POMONA

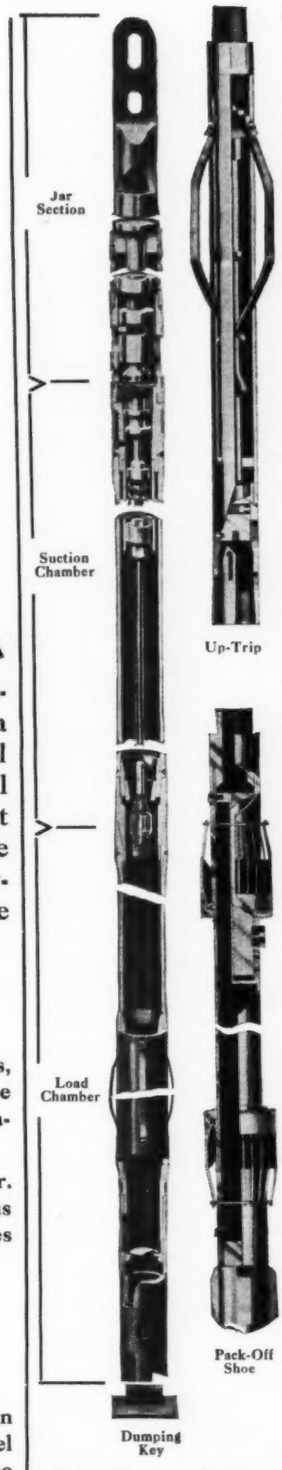
En todas partes donde se maneja agua, sea ésta una utilidad o un estorbo, para un servicio continuo o intermitente, los hombres en el negocio del aceite prefieren las bombas de turbina Pomona porque funcionan más económicamente y con toda seguridad. La preferencia mundial para las bombas Pomona es razón por qué se venden más de ellas, lo que ha hecho posible poder mantener una organización, la cual ofrece el mejor servicio y el más seguro de la industria. No pueden equivocarse con la principal de las bombas.

POMONA PUMP CO.

Manufacturing Plants: Pomona, Calif.
St. Louis, Mo.

SALES OFFICES
New York, Chicago, Los Angeles, San Francisco.

POMONA
TURBINE PUMPS



THE CAVINS
AUTOMATIC HYDRAULIC SUCTION BAILER and FISHING TOOL

Utilizing the tremendous hydrostatic pressure of the column of fluid standing in the well, and with its performance developed to the highest degree of efficiency, The Cavins unquestionably is the fastest, safest, most economical and dependable tool available for (1) ordinary cleanout work; (2) breaking hard-packed sand bridges; (3) cleaning out bridged-over tubing; (4) cleaning out and around partially collapsed pipe; (5) removing pea gravel used for tamping before shooting with "nitro" in open hole territory; (6) fishing out junk; and (7) cleaning out around large fish. It requires no spudding or rigging up; operates at high speed by simply running in and pulling out; loads and dumps automatically; and will have a well cleaned out in less time than it usually takes to get other methods in operation. Easily operated by any crew.

THE CAVINS PERFORATION WASHER consists of the Up-Trip and Pack-Off Shoe in combination with The Cavins Automatic Hydraulic Suction Bailer (see illustrations), and is unequalled for cleaning perforated oil strings, liners and screens; to bring production up to normal. It is also a very valuable tool to use in opening perforations preparatory to cementing; prior to running water locations; or eliminating the source of sand bridges.

Write for illustrated descriptive bulletins giving complete information regarding both these essential tools.

Tirant parti de la formidable pression hydrostatique de la colonne de fluide qui existe dans le puits, et d'un fonctionnement développé au plus haut degré de rendement, le Cavins est sans conteste l'outil le plus rapide, le plus sûr, le plus économique et le plus régulier sur le marché pour (1) travail de nettoyage courant; (2) rupture de ponts de sable très tassé; (3) nettoyage de tube de pontage; (4) nettoyage dedans et autour de tuyau particllement affaissé; (5) extraction du gravier "pois" employé comme bourrage avant d'injecter du "nitro" en région à trous ouverts; (6) repêchage de ferraille; et (7) nettoyage autour de gros objet repêché. Il ne demande ni montage, ni emploi de béquille; il fonctionne à grande vitesse simplement en laissant descendre et en tirant dehors; il charge et décharge automatiquement; et il peut nettoyer un puits en moins de temps qu'il ne faut d'ordinaire pour la mise en train par les autres méthodes. Toute équipe l'emploie sans difficulté.

LE LAVEUR DE PERFORATIONS CAVINS consiste du sabot de bourrage et de remontée en combinaison avec l'ecopeur automatique de succion hydraulique Cavins (voir clichés), et est sans pair pour nettoyer les colonnes de pétrole perforées, revêtements et tamis, aux fins de rendre la production normale. C'est aussi un outil fort précieux pour ouvrir les perforations en vue de la cimentation, avant d'épuiser des gîtes aqueux, ou pour éliminer la source de ponts de sable.

Demandez-nous des notices descriptives illustrées qui donnent des détails complets sur ces deux outils essentiels.

Utilizando la gran fuerza hidrostática de la columna de líquido que existe en el pozo, y con un funcionamiento desarrollado al más alto grado de rendimiento, la Cavins es sin duda alguna, la herramienta más rápida, segura y económica del mercado, para (1) trabajo de limpieza corriente; (2) ruptura de puentes de arena bien apretados; (3) limpieza de tubería rehabilitada; (4) limpieza por dentro y por fuera de tubería parcialmente aflojada; (5) extracción de la grava o cascajo empleado para apisonar, antes de la inyección de "nitro" en pozos sin tubería; (6) extracción de herrajes y (7) limpieza alrededor de la herramienta grande pescada. No requiere ningún montaje y funciona a gran velocidad, sencillamente bajándolo y subiéndolo; se carga y se descarga automáticamente; y limpia muy bien el pozo en menos tiempo que el consumido en la preparación sola de cualquier otro método. Los operarios corrientes pueden manejarlo sin la menor dificultad.

EL LAVADOR DE PERFORACION CAVINS consta de una zapata de empaque y de subida en combinación con un achicador automático de succión o aspiración hidráulica Cavins (vea los grabados) que no tiene rival para limpiar las columnas de petróleo perforadas, revestimientos y cribas, con el fin de obtener una producción normal. Es también una herramienta muy valiosa para abrir perforaciones, en conexión con la cementación, antes de agotar las acumulaciones de agua, o para eliminar la causa de los puentes de arena.

Pídanos nuestros boletines descriptivos e ilustrados, en que damos información detallada sobre estas dos herramientas esenciales.

Right: The result of a fishing job intended to recover three cones. More than 150 pounds of other junk which the crew did not know about also was recovered. Use of The Cavins has eliminated thousands of dollars in losses through idle time and hit-and-miss fishing methods.

Left: A mountain of sand shown bailed out of a West Texas well with The Cavins in from one-third to one-fifth the time required by other methods.

THE CAVINS COMPANY

2853-73 Cherry Avenue, (Phone 414-14, 414-60)
LONG BEACH, CALIFORNIA, U. S. A.

Cable Address: "Cavins, Long Beach"
Foreign Representative: R. J. Eiche
Eiche and Flanders, *Foreign Representative:* San Fernando, Trinidad, B. W. I.

caliber. These designers built engines of successively higher compression ratios year after year until now, with many countries racing to build large fleets of fighting planes equipped with engines demanding 100 octane number (army method) motor fuel, there is sufficient justification to manufacture this material. It is also probable that an increasing volume of this grade of material will be used by the commercial and private planes, particularly as a starting fuel. In the massive planes that are being built, which are expected to elevate at a mile a minute, or more, such fuels are indispensable. Also, it is known that as fuels of this higher quality find application in airplane engines, they will find their way into the regular passenger car market, if not as isooctane, or as a 100 octane fuel, possibly as a blend of isooctane and cracked or straightrun gasolines to make an 80 or 90 octane fuel.

Obviously, a refiner who seeks only the business of truck drivers would have no need for an isooctane unit at present. If he wants to supply aviators, the refiner will need more than a skimming plant, and, if the refiner was to bid for the business of motorists generally, he would find he needed equipment that would not be as complicated and restricted in output as an isooctane plant, nor as simple as a skimming plant. He would require at least some ordinary cracking equipment.

Also, if the refiner wanted to reach all the three classes of market, he would be expected to balance his operations, utilizing an isooctane plant or its equivalent to make the highest octane motor fuels, cracking and reforming equipment to supply the great bulk of the ordinary motor gasoline and fractionating equipment which will most economically separate the straightrun gasoline out of the crude.

SEVERAL FURNACES

Although these combination units operate as one piece of equipment, they receive their energy from several sources. Without exception these units utilize two or more furnaces or coils.

Much greater flexibility is provided through the operation of separately fired coils and the tendency has been to include as many coils in the combination unit as there were separate duties to perform.

DESIGN OF HEATERS

Each of these coils is designed to handle best the service into which it was placed, the design being governed by the intensity of heat, pressure and capacity. The principle of the center-fired, upshot furnace was utilized in several of the combination units.

In the selection of tubes for all heaters, there is a tendency to install ordinary carbon steel tubes wherever they will withstand the pressures and temperature involved.

In at least one of the more recent furnace installations calling for high-temperature resisting steels, tubes with upset ends were supplied. These tubes were so made to eliminate rolling, each end taking a specially designed header connection.

Almost without exception the larger furnaces are supported entirely on a steel frame, the walls being suspended and cooled by the incoming air used for combustion.

Materials of higher refractory value are used and the control of the hot gases of combustion through the furnace has become so exacting as to practically eliminate coking or the development of local "hot spots."

(Continued on Page 240-G)

d'avions de combat à moteurs exigeant du carburant moteur d'indice octane 100 (méthode de l'armée), on est bien fondé à fabriquer un tel carburant. Il est probable aussi qu'un volume croissant de ce type de carburant est appelé à être consommé par les avions commerciaux et privés, et notamment comme carburant de démarrage. A bord des avions massifs actuellement en cours de construction, prévus pour s'élever à raison d'un mille à la minute, ou plus, ce type de carburant sera de rigueur. En outre, on sait que parallèlement à la vogue de cette qualité supérieure de carburants en aviation, ils trouveront aussi un débouché dans le domaine des voitures de tourisme, sinon comme isooctane ou carburant d'indice octane 100, du moins sous forme de mélanges dosés d'essences type isooctane et type cracké ou de distillation pour donner un carburant d'indice octane 80 ou 90.

Il est clair que si un raffineur ne cherche que la clientèle de camionneurs, il n'aura pas besoin d'une installation isooctane pour le moment. S'il vise à fournir les aviateurs, le raffineur ne pourra se contenter d'une installation de distillation non poussée, et s'il devait solliciter la clientèle des automobilistes en général, il sentirait le besoin d'un matériel qui ne soit pas aussi compliqué et de rendement aussi restreint que'une installation isooctane, et pourtant pas aussi simple qu'une installation de distillation non poussée. Il aurait besoin d'au moins quelque matérial de cracking ordinaire.

En outre, si le raffineur visait ces trois catégories de clients, il devrait équilibrer ses opérations, et cela en utilisant une installation d'isooctane ou son équivalent pour faire les carburants moteurs d'indice octane maximum, un matériel de cracking et de réforme pour fournir le plus gros de l'essence à moteur ordinaire, et enfin du matériel de fractionnement qui extraie le plus économiquement possible du pétrole brut l'essence de distillation.

PLURALITE DE FOYERS

Bien que ces groupes-combinaisons fonctionnent comme une seule unité, ils reçoivent leur énergie de plusieurs sources. Sans exception, ces groupes utilisent deux foyers ou serpentins, ou davantage.

Une souplesse de marche bien plus grande est assurée par l'emploi de serpentins à chauffe séparée, et la tendance a été d'utiliser dans le groupe-combinaison autant de serpentins qu'il y avait de fonctions séparées à accomplir.

(Continué sur Page 240-G)

planos, de combustibles de este calibre. Estos fabricantes hicieron motores de mayor compresión sucesivamente, año tras año, y actualmente tenemos varios países que están acelerando la construcción de grandes brigadas de aviones militarse que exigen combustible de motor del número de 100 octanos (método militar) en vista de lo cual, hay suficiente justificación para la manufactura de este material. Es también muy probable que que una creciente cantidad de esta clase de material se empleará por los aeroplanos comerciales y particulares, particularmente como combustible para el arranque. Para los enormes aeroplanos, que se están construyendo, que se remontarán, según se espera, a razón de una milla por minuto, semejantes combustibles serán indispensables. Se sabe también que, a medida que estos combustibles de mayor fuerza se introduzcan en los motores de aeroplanos, hallarán oportundamente aplicación a los motores de automóviles, si no como isooctano o como número de 100 octanos, posiblemente como una mezcla de isooctano y gasolinas de compresión o de esencia de destilación, formando un combustible de 80 o 90 octanos.

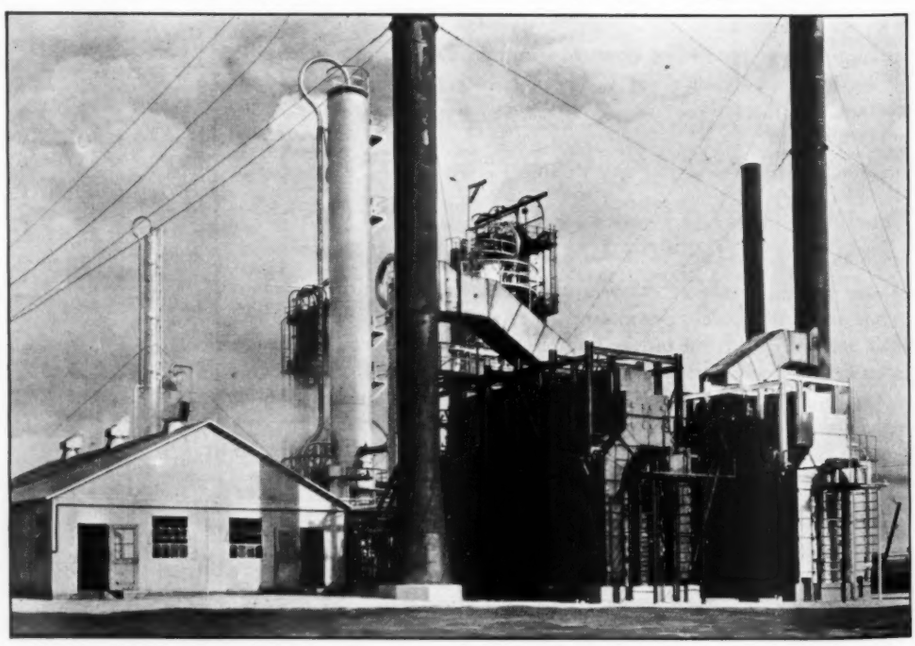
Por esta razón, el refinador que busca sólo el negocio de los dueños de camiones, no tendrá necesidad de una instalación para isooctano, al presente. Si se interesa en vender a los aviadores, el refinador necesitará entonces más que una instalación de destilación sin presión, y si quiere vender a los dueños de automóviles, en general, verá que necesita un equipo que no sea tan complicado ni limitado en rendimiento como una instalación para isooctano, ni tan sencillo como una instalación de destilación sin presión. Necesitará, por lo menos, algún equipo de compresión o cracking de tipo ordinario o corriente.

Por otra parte, si el refinador se interesara en vender combustibles a estas tres clases de consumidores, tendría entonces que compensar sus operaciones, utilizando una instalación para isooctano, o su equivalente, para producir combustibles de motor del mayor grado de octano posible, un equipo de cracking y reformación para siministrar la gran cantidad de gasolina ordinaria para motores y un equipo destilación fraccionada, para separar, de la manera más económica posible, la gasolina de esencia de destilación del petróleo crudo.

HORNOS DIVERSOS

A pesar de que estas instalaciones de combinación funcionan como un solo grupo, reciben su energía de varias fuentes. Sin excepción, estas

(Continué en Página 240-G)



Modern central-fired furnaces and cracking unit as part of the Barnsdall Oil Co. plant at Wichita, Kans.

Fours a foyer central et groupe de cracking modernes faisant partie de l'installation de la Barnsdall Oil Co. a Wichita, Kans.

Modernos hornos de calentamiento central y equipo de cracking, incluidos en la instalacion de la Barnsdall Oil Co. en Wichita, Kans., E.U.A.

HUNTING...

FOR a dependable diamond substitute and hard surfacing metal is ended when you standardize on the complete line of OSAGE METAL. Osage Inserts are a uniform cast Tungsten Carbide of the correct hardness combined with just the correct amount of toughness to insure the user of a Diamond Substitute the maximum amount of efficiency. In addition to the inserts OSAGE also offers a complete line of both *Electric* and *Acetylene Amalgamated Rod* and *Acetylene Tube Metal* and *Both Electric* and *Acetylene OSAGE A & B Hard Surfacing Rod* which will answer any of your hard facing problems.

Descriptive catalog, printed in either Spanish or English, will be sent upon request.

SOLD BY: Wessendorff Nelms & Co., Houston, Tyler and Corpus Christi, Texas; Big Three Welding Equipment Co., Houston and Fort Worth, Texas, Oklahoma City and Tulsa, Okla.; Houston Oxygen Co., Houston, Texas; Corpus Christi Oxygen Co., Corpus Christi, Texas; Consumers Oxygen Co., New Orleans, La.; Modern Engineering Co., St. Louis, Missouri; Layne Atlantic Co., Norfolk, Va.

●Se termina la caza de un substituto de diamante digno de confianza o de un metal duro de chapa o revestimiento cuando se emplea preferentemente el completo surtido de METALES OSAGE. Las piezas de inserción Osage son fundidas de carburo de tungsteno uniforme, de correcta duración y del exacto grado de dureza para asegurar al que emplea un substituto de diamante un rendimiento máximo. En adición a las piezas de inserción, OSAGE ofrece también un surtido completo de barras amalgamadas eléctricas y de acetileno, metal de tubo de acetileno y barras duras de revestimiento eléctricas y de acetileno OSAGE A & B, que resolverán todos sus problemas de revestimiento de gran dureza.

A solicitud enviaremos catálogo descriptivo en español o en inglés.

●Plus de chasse après un succédané du diamant de confiance ou après un métal de placage dur, quand vous standardisez sur la série complète de METAL OSAGE. Les pièces rapportées Osage sont du carbure de tungstène coulé uniforme de la dureté juste combinée avec le degré voulu de ténacité aux fins d'assurer à l'usager du succédané du diamant un maximum d'efficacité. En plus des pièces rapportées, OSAGE offre aussi une série complète de *barre amalgamée* à la fois *électrique* et *acétylène*, et de *métal de tube acétylène*, et de *barre de placage dur OSAGE A & B* à la fois *électrique et acétylène*, ce qui sera pour vous la solution de vos problèmes de placage dur.

Catalogue descriptif imprimé soit en espagnol, soit en anglais, fourni sur demande.

OSAGE
METAL CO., Inc.
Oklahoma City, Okla.

Export Agents: Petroleum Machinery Corporation, 30 Rockefeller Plaza, New York City, N. Y. *Mexican Agents:* Electrodos, S. A. Monterrey, N. L. Mexico.

GAS LIFT YOUR OIL WITH P & T KICK-OFF UNITS

Use P & T Kick-Off Units—
- TO PUMP WELLS.
- TO CAUSE A NATURAL FLOW.
- TO BRING IN NEW WELLS OR GAS LIFT.

Well can be flowed either through tubing or casing. Big savings in time and money with P&T Kick-Off Units. Write for bulletin.

MONTEZ VOTRE PETROLE AU GAZ AU MOYEN DES UNITES DE REPRISE P & T

Employez les unités de reprise P & T—
- POUR POMPER LES PUITS
- POUR CAUSER L'ECOULEMENT NATUREL
- POUR EPUISER DE NOUVEAUX PUITS OU MONTER AU GAZ.

On peut exploiter le puits soit par tubage, soit par revêtement. Grandes économies de temps et d'argent avec les unités de reprise P & T. Notice sur demande.

LEVANTE SU PETROLEO CON GAS MEDIANTE LAS VALVULAS CEBADORAS P & T

Emplée las válvulas cebadoras P & T
- PARA EL BOMBEO DE POZOS.
- PARA PROMOVER UNA CORRIENTE NATURAL.
- PARA ACTIVAR NUEVOS POZOS O LEVANTAR CON GAS.

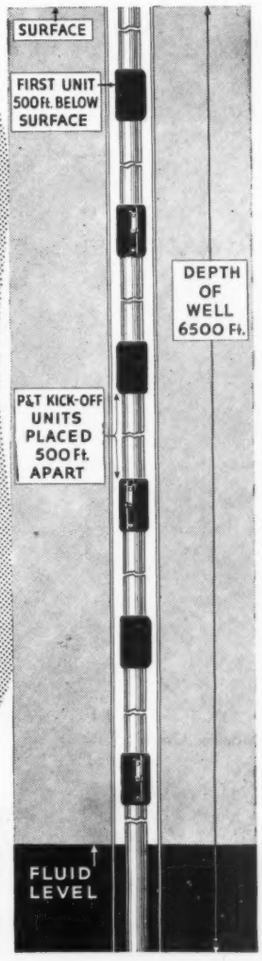
Los pozos pueden explotarse mediante tubería o mediante revestimiento. Grandes ahorros en tiempo y en gastos con las válvulas cebadoras P & T. Pídanos boletín.

PRICE-TRAWICK, INC., STROUD, OKLAHOMA, U. S. A.

P & T Kick-Off Units on a pumping well. Units also serve as tubing coupling.

Unités de reprise P & T sur un puits de pompage. Ces unités servent aussi de raccord de tuyauterie.

Válvulas cebadoras P & T en un pozo de bombeo. Estas válvulas sirven también de acoplamiento de tubería.



New Deal Pipe Cleaning Machines

Typical Scene New Deal Model "B" Hi-Speed Duo-Hydraulic Pipe Straightener (left) and New Deal Master De-Luxe Model Pipe Cleaning Machine in operation.

Scène typique: Machine à redresser les tuyaux (à gauche), duo-hydraulique et de grande vitesse, New Deal Modèle "B", et machine à nettoyer les tuyaux New Deal Modèle Master de luxe, en service.

En esta típica escena mostramos el modelo "B" de enderezadora de tubos New Deal Hi-Speed Duo-Hydraulic (a la izquierda) y el modelo De-Luxe de máquina limpiadora de tubos New Deal en funcionamiento.

Remove Dirt, Rust, Scale and Corrosion

The New Deal Pipe Cleaning Machines, combining engineering research, manufacturing skill and practical field experience, have brought an important development in this line of equipment. They are sturdily constructed units for the rapid, efficient, economical removal of dirt, rust, scale and corrosion from the surface of pipe and casing. Made in three models and several sizes to meet the specific needs of oil and gas companies, pipe lines, utilities and pipe yards.

Enlévent saleté, rouille, incrustation et corrosion

Les machines à nettoyer les tuyaux New Deal, le résultat combiné des recherches techniques, de l'habileté en fabrication et de l'expérience pratique au chantier, ont marqué un progrès important dans ce genre de matériel. Ce sont des groupes robustes, prévus pour enlever rapidement, efficacement et économiquement la saleté, la rouille, les incrustations et la corrosion de la surface des tuyaux et des revêtements. Il en est prévu trois modèles et plusieurs tailles afin de répondre aux divers besoins des compagnies de pétrole et de gaz, de pipe-lines, d'utilités et chantiers de conduites.

Quita la tierra, moho, costra y corrosión

Las máquinas New Deal de limpiar tubería, que combinan estudios técnicos, habilidad manufacturera y experiencia práctica en el campo, representan un importante perfeccionamiento en su respectivo ramo. Son máquinas de muy firme construcción, especialmente proyectadas para quitar, con suma rapidez y economía, la tierra, moho, costra y corrosión de la superficie de tubos y revestimientos. Se ofrecen en tres modelos y en varios tamaños, para satisfacer los requisitos particulares de compañías de petróleo y de gas, sistemas de distribución o transporte, empresas de utilidad pública y establecimientos de tuberías.

All Machines Patented and Equipped With

Gear-driven Brushing Attachment; Removable Reversible Blades; Safety Automatic Self-Locking Guide Handle; Dual Hi-Speed Guide Rollers; Four Auxiliary Stands; Dust-Proof Bearings; Steel Channel Frames, Cross Braced; Pressure Lubricated; Guns Furnished. All models 25 feet long; 32 inches wide; frame height 26 inches. Each model has several exclusive features; designed for easy portability or stationary use.

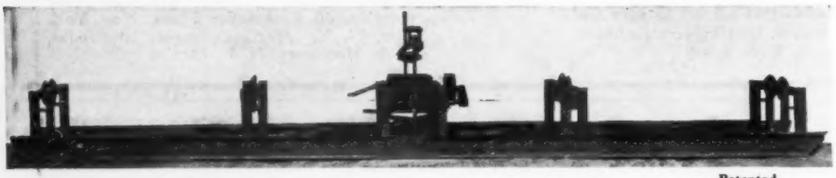
Toutes machines brevetées et équipées avec

accessoire de brossage à commande à engrenages; lames réversibles et amovibles; poignée-guide automatique de sûreté à auto-verrouillage; galets-guides doubles de grande vitesse; quatre supports auxiliaires; paliers à l'abri de la poussière; châssis en poutrelle d'acier, avec entretoises; graissage sous pression; seringues prévues. Tous les modèles ont 25 pieds de long, 32 pouces de large et 26 pouces de hauteur de châssis. Chaque modèle a plusieurs avantages exclusifs; prévu de type facilement portable ou de type fixe.

Todas las máquinas están patentadas y equipadas con

Aditamiento de barrer accionado por engranajes; cuchillas reversibles amovibles; mango guiador de cierre automático de seguridad; rodillos guiadores dobles de alta velocidad; cuatro soportes auxiliares; conjinetes protegidos contra el polvo; armazón de acero acanalado con refuerzos transversales; lubricación bajo presión, incluyendo las pistolas de engrase. Todos los modelos tienen 25 pies de longitud, 32 pulgadas de anchura, con armazón o bastidor de 26 pulgadas de altura. Cada modelo se caracteriza por varios rasgos exclusivos. Todos se prestan a fácil transporte y a servicio en instalaciones fijas.

REGULAR MODEL — MODELE COURANT — MODELO CORRIENT



Patented

"Regular" Model

Contains many features of the larger, more expensive units.

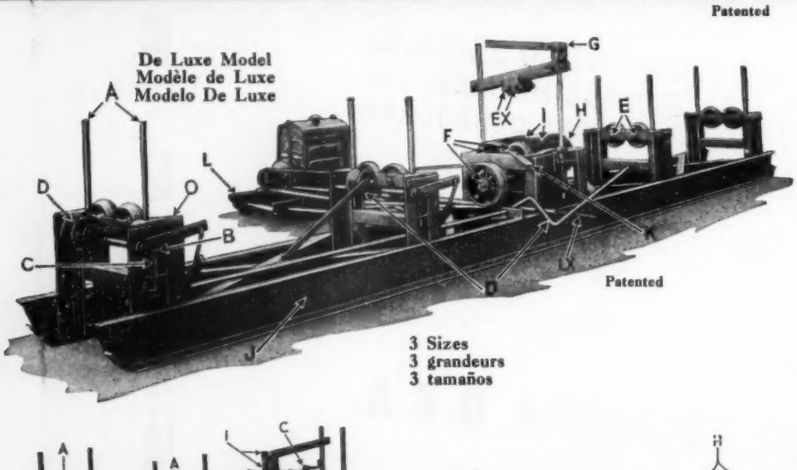
Model "corriente"

Il a bien des caractéristiques des groupes plus grands et plus chers.

Modelo "corriente"

Comprende muchos de los rasgos del modelo más grande y costoso.

De Luxe Model
Modèle de Luxe
Modelo De Luxe



Patented

3 Sizes
3 grandeurs
3 tamaños

De Lux Model
(Pipe Line Special)

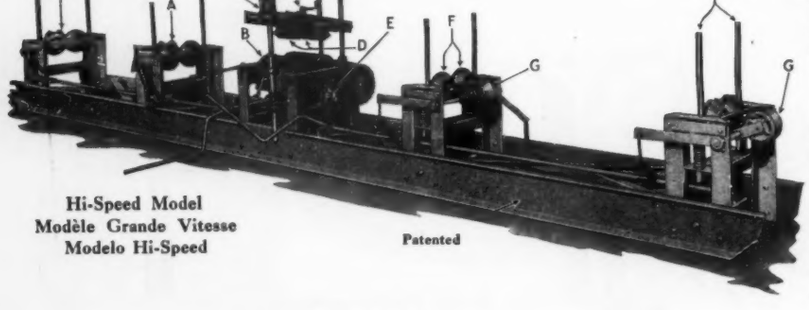
The De Lux Model (made in 3 sizes), designed and built especially to meet the needs of gas, utility and pipe line companies. Specially constructed to handle pipe that is not quite straight.

Modèle de luxe
(Spécial pour pipe-lines)

Le modèle de luxe (prévu en 3 tailles) est conçu et réalisé spécialement pour répondre aux besoins des compagnies de gaz, d'utilités et de pipe-lines. Prévu spécialement pour les conduites qui ne sont pas tout à fait droites.

Modelo De Luxe
(Especial para sistemas de tubería)

El modelo De Luxe, ofrecido en 3 tamaños, ha sido proyectado y construido especialmente para responder a las necesidades de compañías de gas, empresas de servicios públicos y sistemas de oleductos. Se adapta especialmente al manejo de tubos que no son perfectamente rectos.



Hi-Speed Model
Modèle Grande Vitesse
Modelo Hi-Speed

Patented

"Hi-Speed" Model
(The Complete Machine)

For big jobs involving miles and miles of pipe at high speed, where time, low cost per foot of cleaning, and minimum parts requirements are essential. This machine is the result of two years Engineering Research and Field Tests. Greater Speed—More Power—Greater Capacity—Heavier Construction Throughout—Complete With Power (Gas, Gasoline or Electric).

Modèle "Grande Vitesse"
(La machine complète)

Prévue pour les grands travaux comportant des kilomètres de tuyaux à nettoyer à grande vitesse où le temps, le bas prix de revient du nettoyage unitaire, et un minimum de pièces sont essentiels. Cette machine est le fruit de deux ans de recherches techniques et d'essais de chantier. Plus grande vitesse—plus grande puissance—plus grande capacité—plus forte construction en tous points—au complet avec groupe-moteur (gaz, essence ou électrique).

Modelo "Hi-Speed"
(La máquina completa)

Para importantes trabajos de limpieza de miles y miles de kilómetros de tubería, que han de realizarse con suma rapidez, en el menor tiempo posible, a mínimo costo por metro y con mínimos gastos en repuestos y otros accesorios. Esta admirable máquina es el resultado de dos años de estudios técnicos y ensayos prácticos. Mayor velocidad, mayor fuerza, mayor capacidad y construcción general más firme y durable. Se suministra completa con motor de gas, de gasolina o eléctrico.

REGULAR MODELS

	HEAVY DUTY	STANDARD
Capacity	2" to 10¾" OD	¾" ID to 8⅝" OD
Weight	1865 lbs.	1765 lbs.
Power Required	10 HP Engine or 5 HP Motor	10 HP Engine or 5 HP Motor
Price	$625.00	$550.00
Crate	1300 lbs.	1300 lbs.
Export Weight	3165 lbs., 1438 kilos	3065 lbs., 1390 kilos
Crating	Extra	Extra

Power and pulleys extra

MASTER

2" to 14" OD

2300 lbs.
12 HP Engine or 5 HP Motor
$825.00
1300 lbs., 590 kilos
3600 lbs., 1635 kilos
Extra

DE LUX MODELS

	HEAVY DUTY	STANDARD
	2" to 10¾" OD	¾" ID to 8⅝" OD
	2000 lbs.	1875 lbs.
	10 HP Engine or 5 HP Motor	10 HP Engine or 5 HP Motor
	$750.00	$675.00
	Same	Same
	3300 lbs., 1500 kilos	3175 lbs., 1443 kilos
	Extra	Extra

Frame Drilled for dual unloaders.
Power and pulleys extra.

"HI-SPEED" MODEL

3" to 14" OD. Adapter for 2"
3400 lbs.
$1550.00
1300 lbs., 590 kilos
4700 lbs., 2135 kilos

Power and pulleys furnished

See Note Below.

Note—Hi-Speed Model—For Oceanic Export: Machine Crated Free.—For U. S., Canada, Northern Mexico: Instructor furnished to supervise installation and train crew, in lieu of crating machine.

All prices F. O. B. Tulsa, Oklahoma. Payable in U. S. Currency.

New Deal

Duo-Hydraulic Pipe Straighteners and Pipe Bending Machines

KNOWN AROUND THE WORLD

RECLAIM BENT AND CROOKED PIPE

The New Deal Duo-Hydraulic Pipe Straighteners and Bending Machines. Special design, super construction, speed, power and flexibility for reclaiming bent and crooked pipe, casing, rotary drill stems and Kellys, structural steel, rails, round and flat iron, etc. Five models of varying power, strength, capacity and speed.

ALL MACHINES EQUIPPED WITH:

Hydraulic Cylinders, of New Hydraulic Seamless Steel Standard Size Leather Cup; Interchangeable Pipe Shoes; Enclosed Return Springs; Carrying Rollers; Steel Frames (no wood to rot); Our Own Pumps, built for long life. Each model has special features in addition. All models 12 ft. long; on steel frames mounted on steel sleds.

REGENERATION DE TUYAUX COURBES ET TORDUS

Les machines duo-hydrauliques New Deal à redresser et à courber les tuyaux se distinguent par un tracé spécial, une construction supérieure, et un haut degré de vitesse, puissance et souplesse pour régénérer le matériel courbé ou tordu; tuyaux, revêtements, tiges de forage rotatif et Kellys, acier profilé, rails, fer rond et plat, etc. Cinq modèles de puissance, force, capacité et vitesses variées.

TOUTES LES MACHINES SONT EQUIPEES DE:

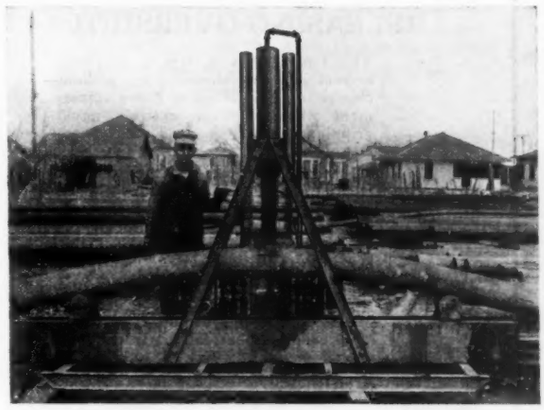
Cylindres hydrauliques en nouvel acier hydraulique sans soudure; cuvette de cuir de taille standard; sabots de tuyau interchangeables; ressorts de rappel enfermés; galets de transport; bâtis en acier (pas de bois pourrissable); nos propres pompes, construites pour durer. Chaque modèle a des caractéristiques spéciales en plus. Tous les modèles ont 12 pieds de long; sur bâtis en acier montés sur patins d'acier.

REHABILITA LOS TUBOS DOBLADOS O TORCIDOS

Las máquinas enderezadoras y dobladores de tubos New Deal Duo-Hydraulic de especial proyecto y firme construcción, rápidas, poderosas y de amplia capacidad, sirven para rehabilitar tubos, revestimientos, vastagos de perforadores rotativos, kellys, acero de construcción, rieles, hierro plano y redondo y otras piezas dobladas o torcidos. Cinco modelos de diferentes características de fuerza, firmeza, capacidad y rapidez.

TODAS LAS MAQUINAS ESTAN EQUIPADAS CON

Cilindros hidráulicos de nuevo acero hidráulico sin costura; sostén de cuero de tamaño normal; zapatas de tubo intercambiables; resortes de retracción protegidos; rodillos de soporte; bastidores de acero, sin madera expuesta a pudrirse; bombas de nuestra propia construcción, de gran duración. Cada modelo tiene ventajas características, además de las comunes para todos. Todos los modelos tienen 12 pies de longitud. Van instalados en bastidores de acero soportados en patines de acero.



CROOKED JOINT OF PIPE. Five minutes later this was a straight joint of 32 lb. 8" casing.
JOINT DE TUYAU TORDU. Cinq minutes plus tard, on avait un joint redressé de revêtement de 8 pouces, 32 lbs.
JUNTA TORCIDA DE UN TUBO. Cinco minutos después, esta junta quedo bien enderezada e instalada en un revestimiento de 8" de 32 libras.

SPECIAL MODELS BUILT FOR SPECIAL REQUIREMENTS—

MODELS "A", "B", AND "C"—(New Deal) are adequate in size, capacity, speed, construction and ram pressure to meet all ordinary requirements. Handles pipe, structural steel, rails, round and flat iron, etc.

MODEL "A"—The Pipeliner's Friend—Manual operated, carrying wheels and shoes designed to fit the pipe. Ram stroke 18" maximum capacity 8⅝" OD.

MODEL "B"—Maximum capacity 8⅝" OD-29 lbs. Equipped with Hi-Speed Triplex pumps. Ram stroke 24". Power required: 5 H.P. electric or 6 H.P. engine.

MODEL "C"—The pumps are HI-PRESSURE Triplex pumps. 8⅝" OD, 32 or 36 lb. Maximum capacity. Power required: 5 H.P. electric or 6 H.P. engine.

MODEL "D"—BEN FRANKLIN SPECIAL—Most complete, compact and modern machine yet perfected. Normal maximum capacity 8⅝" O.D. Ram stroke 24". Both Hi-Pressure and Hi-Speed Triplex pumps, with 10 H.P. motor, give maximum 90,000 lbs. on the ram. Attachments for 10¾" OD—extra $55.00.

MODELES SPECIAUX POUR CAS SPECIAUX

MODELES "A", "B" et "C"—(New Deal) de taille, capacité, vitesse, construction et pression de bélier amplement calculées pour répondre à toutes les conditions normales. Prévus pour tuyau, acier profilé, rails, fer rond et plat, etc.

MODELE "A"—L'ami de l'installeur de pipe-lines—à commande manuelle, roues de transport et cabots étudiés pour s'adapter au tuyau. Course du bélier 18 pouces, capacité maximum 8⅝ pouces de diamètre extérieur.

MODELE "B"—Capacité maximum 8⅝ pouces diamètre extérieur 29 lbs. Muni de pompes triplex de grande vitesse. Course du bélier 24 pouces. Puissance nécessaire: Electrique 5 CV ou moteur combustion interne 6 CV.

MODELE "C"—Les pompes sont des pompes triplex de HAUTE PRESSION. Diamètre extérieur 8⅝ pouces, capacité maximum de 32 ou 36 lbs. Puissance nécessaire: Electrique 5 CV ou moteur combustion interne 6 CV.

MODELE "D"—BEN FRANKLIN SPECIAL—La machine la plus complète, la plus compacte et la plus moderne à ce jour. Capacité maximum normale 8⅝ pouces de diamètre extérieur. Course de bélier 24 pouces. Pompes triplex de haute pression et de grande vitesse, avec moteur de 10 CV, donnant un maximum de 90.000 lbs. sur le bélier. Accessoires pour diamètre extérieur de 10¾ pouces—moyennant supplément de $55.00.

MODELOS ESPECIALES CONSTRUIDOS PARA REQUISITOS ESPECIALES

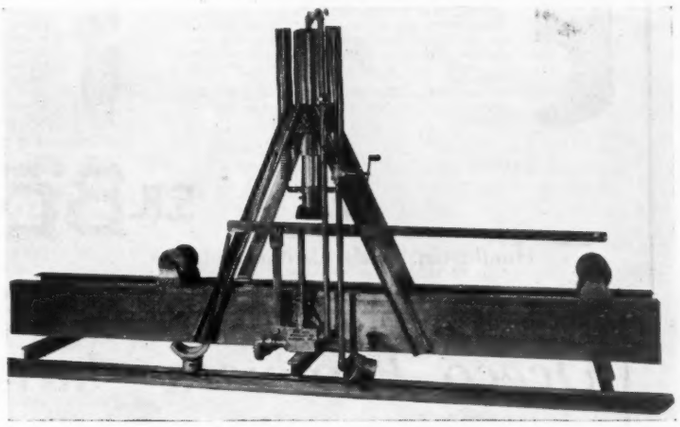
MODELOS "A", "B", y "C"—(New Deal) son adecuados en tamaño, capacidad velocidad, construcción y presión re ariete, para satisfacer todos los requisitos ordinarios. Sirve para tubos, acero de construcción, rieles, hierro plan y redondo, etc.

MODELO "A"—"El Amigo del Instalador de Tubos"—De funcionamiento manual, provisto de ruedas y zapatas para admitir muy bien el tubo. Carrera del ariete, 18" como máximo, con cabida para tubo de 8⅝" de diámetro exterior.

MODELO "B"—Cabida o admisión máxima, 8⅝" de diámetro exterior y 29 libras. Equipado con grupo de triple bomba Hi-Speed. Carrera del ariete, 24". Fuerza requerida, 5 c. de f. con motor eléctrico, o 6 c. de f. con motor de combustión interna.

MODELO "C"—Provisto de grupo de triple bomba HI-PRESSURE, con admisión para tubo de 8⅝" de diámetro exterior, de 32 o 36 libras, como capacidad máxima. Fuerza requerida, 5 c. de f. con motor eléctrico, o 6 c. de f. con motor de combustión interna.

MODELO "D"—BEN FRANKLIN ESPECIAL—La máquina más completa, compacta y moderna, de todas las de su clase, del mercado. Capacidad máxima normal, 8⅝" de diámetro exterior, con carrera de ariete de 24". Grupos de triple bomba Hi-Pressure y Hi-Speed, con motor de 10 c. de f. para asegurar una presión máxima de ariete de 90.000 libras. Aditamiento para admitir tubo de 10¾" de diámetro exterior al precio adicional de $55,00.

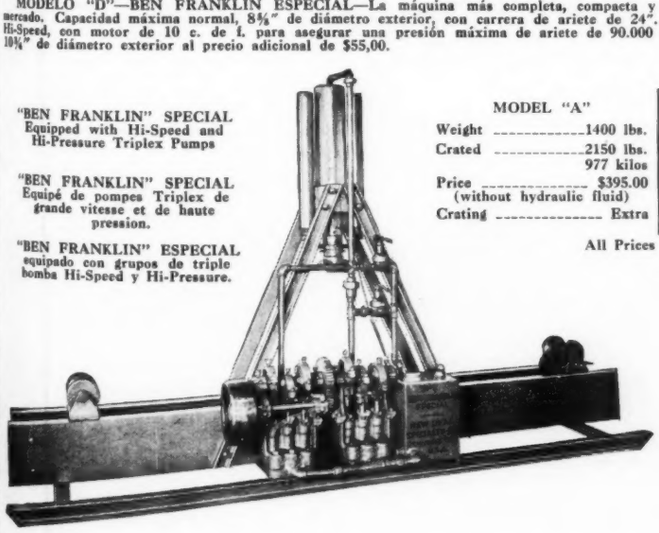


Model "A" Hand Operated
Modèle "A" à commande manuelle
Modelo "A" de funcionamiento manual

"BEN FRANKLIN" SPECIAL
Equipped with Hi-Speed and Hi-Pressure Triplex Pumps

"BEN FRANKLIN" SPECIAL
Equipé de pompes Triplex de grande vitesse et de haute pression.

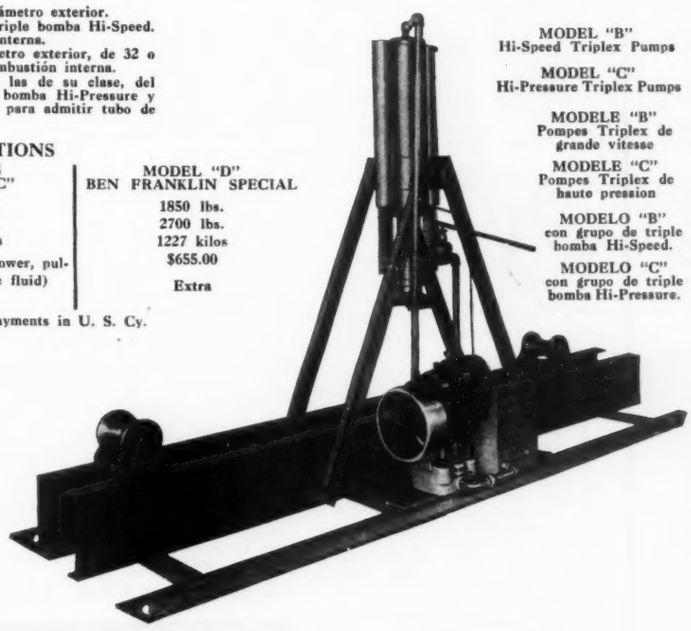
"BEN FRANKLIN" ESPECIAL
equipado con grupos de triple bomba Hi-Speed y Hi-Pressure.



SPECIFICATIONS

	MODEL "A"	MODELS "B" and "C"	MODEL "D" BEN FRANKLIN SPECIAL
Weight	1400 lbs.	1650 lbs.	1850 lbs.
Crated	2150 lbs.	2400 lbs.	2700 lbs.
	977 kilos	1090 kilos	1227 kilos
Price (without hydraulic fluid)	$395.00	$455.00 (without power, pulley or hydraulic fluid)	$655.00
Crating	Extra	Extra	Extra

All Prices F. O. B. Tulsa—Payments in U. S. Cy.



MODEL "B"
Hi-Speed Triplex Pumps

MODEL "C"
Hi-Pressure Triplex Pumps

MODELE "B"
Pompes Triplex de grande vitesse

MODELE "C"
Pompes Triplex de haute pression

MODELO "B"
con grupo de triple bomba Hi-Speed.

MODELO "C"
con grupo de triple bomba Hi-Pressure.

Write for Complete Illustrated Catalog

The NEW DEAL SPECIALTY CO.

— INC. —

OKMULGEE, OKLA., U.S.A.

Export—Lucey Export Corporation

3505 Woolworth Bldg., New York, N. Y.

Broad Street House, London, E.C. 2, England

Our Catalog is filed in the COMPOSITE CATALOG

See New Deal section in 1938 COMPOSITE CATALOG.

BOWEN *FISHING TOOL SPECIALTIES*

BOWEN RELEASING OVERSHOT

This tool catches drill pipe, couplings or tool joints whichever is up, without change of slips, or making any adjustment whatever. An entirely novel gripping member is used in this accomplishment.

Its release from the fish is simple and positive. A downward bump followed by slight rotation to the right simultaneous with upward movement, releases the hold of the gripping member from the fish. Designed with minimum outside diameter this tool will stand the maximum of hard usage.

Means for packing off on either drill pipe, couplings or tool joints are provided.

AGARRADOR DE DISPARO BOWEN

Esta herramienta agarra el tubo de perforación, los acoplamientos o las juntas de herramientas, sin necesidad de cambiar los sujetadores o de hacer cualquier otro ajuste. Para ésto, la herramienta se vale de un miembro de agarro completamente nuevo. Su soltura del elemento pescador es sencilla y positiva. Un golpe hacia abajo, seguido por una leve rotación hacia la derecha simultáneamente con un movimiento hacia arriba, es suficiente para soltar el miembro de agarro. Tiene un diámetro exterior mínimo y puede resistir el trabajo más duro y exigente.
Se proveen medios para separar el tubo de perforación, acoplamientos o juntas de herramientas.

BOWEN ROTARY JARS

Bowen Rotary Jars have world-wide use and are noted for their simplicity, strength and speed. No torque in the drill pipe is required for their operation. As many as ten blows per minute have been struck. The Standard Bowen Jar is used not only as a fishing jar, but also as a safety device under different conditions. The Special Bowen Jar for fishing (illustrated here) is provided with means whereby the pull required to trip it can be varied without removing it from the well. Recommended only for straight pull fishing operations.

AGITADORES ROTATIVOS BOWEN

Los agitadores rotativos Bowen tienen aplicación universal y son notables por su sencillez, firmeza y rapidez. Para su operación no se requiere esfuerzo de rotación en el tubo de perforación. Ha dado hasta diez golpes por minuto. El agitador Bowen normal no sólo se emplea como agitador de pesca, sino también como un dispositivo de sequridad bajo diferentes condiciones. El agitador Bowen especial para pescar (ilustrado aquí) está provisto de medios por los cuales el tiro o tracción que se requiere para dispararlo puede variarse sin necesidad de sacarlo del pozo. Se recomienda sólo para operaciones de pescar en línea recta.

BOWEN ROTARY RELEASING SPEAR

A sturdy simple effective tool used for: loosening stuck casing, removing liners, left handing casing or tubing from wells and also a liner setting tool. Also used for holding casing while the upper joint is being removed to screw on a nipple cut to the proper length for a permanent landing.

Its releasing mechanism has never been known to fail, even when used under most adverse conditions.

HARPON ROTATIVO DE DISPARO BOWEN

Una herramienta sencilla y muy efectiva para aflojar revestimiento trabado, sacar forros, extraer revestimiento o tubería de los pozos y también para colocar forros. Se utiliza también para sujetar revestimiento mientras la junta superior se quita para atornillarla en una conexión cortada a correcta longitud para asegurar una colocación permanente.

Su mecanismo disparador o soltador nunca se ha sabido que haya fallado alguna vez, aun cuando se haya empleado bajo las más adversas condiciones.

S.R. BOWEN CO.

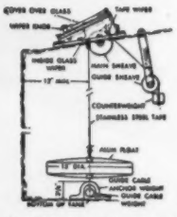
General Offices and Plant:
Huntington Beach, California, U.S.A.

Export Office:
30 Rockefeller Plaza, New York

Oceco Products—have a world-wide reputation

OCECO Type B Vent Unit complete with mounting flange and Oceco Flame Arrestor.

OCECO permanently accurate positive displacement Meter.



OCECO No. 8 Tank Gauge showing assembly and tank mounting.

The wide acceptance Oceco equipment enjoys throughout both hemispheres instantly identifies its dependability and utility.

Oceco Vents control tank breathing. They prevent the free circulation of air . . . and protect the tank against excessive pressure and vacuum. Oceco Vents minimize evaporation losses of refined gasoline and lowered gravity of crude oil. They pay for themselves in a few weeks time. Sizes from 2" to 10"—¼ oz. to 50 lbs. pressure . . . usually furnished complete with mounting flange and Oceco flame arrestor whose world-wide record is:

"NO GAS-TIGHT TANK EQUIPPED WITH AN OCECO FLAME ARRESTOR HAS EVER BEEN LOST BY FIRE."

Oceco Meters operate with permanent and unvarying accuracy. They are unaffected by variations of temperature, viscosity or pressure. Oceco Meters have few moving parts, incur a minimum of wear. They are of rugged construction—and have no levers or delicate mechanisms to get out of order. Sizes to 1000 gallons a minute—each fully calibrated and requiring no further adjustment in the field.

Oceco Tank Gauges permit the taking of accurate tank readings without relieving the pressure in the tank or exposing the gauger to fumes. They are of Oceco's serviceable design and corrosion resisting construction—and are fitted with a plate glass window and inside wiper to insure clear vision. More complete details of these and other Oceco products sent on request.

L'accueil dont jouit l'équipement Oceco dans les deux hémisphères atteste immédiatement sa valeur.

Les Events Oceco suppriment l'évaporation des réservoirs. Ils empêchent la libre circulation de l'air et protègent le réservoir contre une pression et un vide excessifs. Les Events Oceco réduisent au minimum les pertes par évaporation de la gazoline raffinée et de la gravité diminuée de l'huile lourde. Après l'emploi de quelques semaines on en a économisé le prix. Grandeurs de 2 à 10 pouces —¼ oz. à 50 lbs. de pression . . . ordinairement fournis avec bride de monture et pare =flamme Oceco dont voici la réputation dans le monde entier:

"AUCUN RÉSERVOIR ÉTANCHE AUX GAZ MUNI D'UN PARE=FLAMME OCECO Á EVENT N'A JAMAIS PRIS FEU."

Les Compteurs Oceco opèrent avec une exactitude permanente et invariable. Les variations de la température, de la vis= cosité ou de la pression ne les touchent pas. Ayant peu de parties mobiles ils ne s'usent pas facilement. Ils sont d'une construction forte, et n'ont ni leviers ni mécanisme délicat qui pourraient s'abimer facilement. Grandeurs jusju' à 1000 gallons par minute —chacun bien étalonné et n'ayant besoin d'aucun ajustement daus le champ.

Avec les Vérificateurs de réservoir Oceco on peut faire le relevé des consommations sans diminuer la pression dans le réservoir ou sans exposer le vérificateur aux vapeurs. Sur demande on enverra des détails complets des produits ci-dessus et d'autres produits Oceco.

La buena acogida de que goza el equipo Oceco en los dos hemisferios atesta inmediatamente su valor.

Los Venteos Oceco suprimen la evaporación de los tanques. Impiden la libre circulación del aire y protegen el tanque contra una presión y un vacío excesivos. Los Venteos Oceco reducen al mínimo las pérdidas por evaporación de la gasolina refinada y de la gravedad reducida del petróleo crudo. Se puede economizar el precio de este producto usándolo algunas semanas. Tamaños de 2 a 10 pulgadas—¼ oz. a 50 libras de presión . . . ordinariamente entregado con brida de montura y detenedor de llama Oceco, que tiene en el mundo entero la reputación siguiente:

"NINGUN TANQUE HERMÉTICO AL GAS, PROTEGIDO POR EL DETENEDOR DE LLAMA, SE HA PERIDIDO JAMÁS A CAUSA DE INCENDIO."

Los Contadores Oceco funcionan con una exactitud permanente e invariable. Las variaciones de la temperatura de la viscosidad o de la presión no los afectan. Teniendo pocas partes móviles no se deterioran fácilmente. Son de una construcción fuerte y no tienen ni palanca ni mecanismo delicado que pueda hecharse a perder. Tamaños hasta 1000 galones por minuto—cada uno bien graduado y sin necesitar ningún ajuste en el campo.

Con los Verificadores de Tanques Oceco se puede hacer la lectura de los tanques sin bajar la presión en los tanques o sin exponer el verificador a los vapores. Pídase los detalles completos de los productos mencionados aquí y de otros productos Oceco.

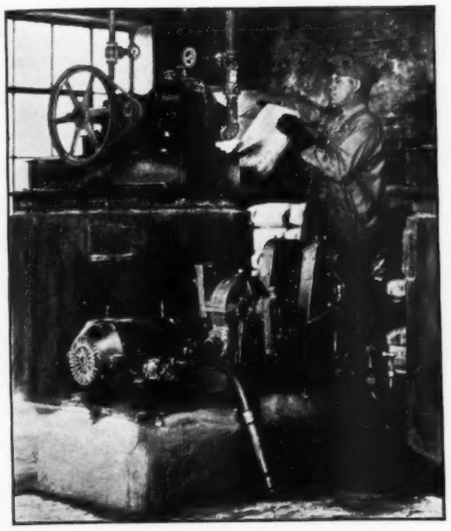
Let us send you fully descriptive catalogs, prices, etc.

Specify Oceco Fittings —Your tanks deserve the best.

THE JOHNSTON & JENNINGS CO., *Oceco Division*
884 ADDISON ROAD • CLEVELAND, OHIO

PUMPS

The pumps which serve these combination installations also vary greatly with respect to type and capacity, depending upon the specific duty in which each is placed. The slow moving reciprocating type of charging pump has proved popular because of its positive action. Centrifugal pumps, driven by electric motor of steam or gas turbines



Mixing lime and water for injection into crude oil before charging to distillation equipment. The lime decreases corrosion

On melange ici de la chaux et de l'eau pour injection dans le petrole brut avant son chargement dans le materiel de distillation. La chaux reduit la corrosion

Mezcla de cal y agua, para inyeccion en el petroleo crudo, antes de su introduccion en el equipo de destilacion. La cal reduce la corrosion

are used almost exclusively in the newer installations for the transfer of oils or as reflux pumps.

Where hot or corrosive oils needed to be transfered, the pump parts which come into contact with the oil have been made of heat and corrosion resisting alloys. Because such a large portion of the work handled by combination units centers around the pumps, their design has been made a separate study for each installation. To show their importance, it has been estimated that nearly as much oil is pumped around through the parts of a single 36,000 bbl., combination unit as the volume of crude oil produced daily in the East Texas field. A unit of this size circulates appromimately 380,000 bbls., daily.

FRACTIONATING TOWERS

Comparatively little change has been made in the design of fractionating towers which serve these modern combination units. The towers follow the conventional bubble cap and tray principle, the reflux is supplied at the top by returning a liquified portion of the overhead and the tower control is entirely automatic.

Large towers are being demanded in the newer installation and apparently the facilities of steel plate manufacturers and those of railroads and ships are the only factors which limit the present size of refinery demands.

Where corrosive oils or vapors are encountered, it has become common practice to press into position or weld a corrosive resisting lining on the

CONSTRUCTION DES RECHAUFFEURS

Chacun de ces serpentins est conçu pour s'adapter au mieux au service auquel il est destiné, le tracè en étant régi par l'intensité de la chaleur, la pression et la capacité. Le principe du foyer à chauffe centrale, dirigée vers le haut, est appliqué dans plusieurs des groupes-combinaisons. Dans la sélection des tubes pour tous les réchauffeurs, on observe la tendance à installer des tubes ordinaires en acier au carbone partout où ils peuvent supporter les pressions et la température régnantes.

Dans une au moins des installations de foyer les plus récentes demandant des aciers résistant aux fortes températures, il a été fourni des tubes à extrémités renflées. Ces tubes ont été faits pour supprimer le laminage, chaque bout recevant un raccord de dérivation de tracé spécial.

Presque sans exception les grands foyers reposent entièrement sur un bâti d'acier, les parois en étant suspendues et refroidies par l'air d'entrée qui est employé à la combustion.

On fait usage de matériaux de haut indice réfractaire et le contrôle des gaz chauds de combustion dans leur traversée du foyer est devenu si serré qu'on a pu presque complètement éliminer la cokéfaction ou production de "points chauds" locaux.

POMPES

Les pompes qui desservent ces installations combinaisons varient aussi dans une grande mesure tant en type que capacité, selon le rôle particulier qu'on assigne à chacune d'elles. Le type à mouvement alternatif et lent de pompe d'admission est devenu très prisé à cause de son action positive. Les pompes centrifuges, actionnées par moteurs électriques ou par des turbines à vapeur ou à gaz sont employées presque exclusivement dans les installations récentes pour le transfert des pétroles ou comme pompes de retour.

Là où l'on doit faire le transfert de pétroles chauds ou corrosifs, les pièces de pompe qui viennent en contact avec le pétrole sont en alliages qui résistent à la chaleur et à la corrosion. Vu qu'une très forte portion du travail accompli par les groupes combinaisons est centré autour des pompes, leur tracé a fait l'objet d'une étude spéciale dans le cas de chaque installation. Pour donner une idée de leur importance, on a estimé qu'il est pompé à travers les organes d'un seul groupe combinaison de 36.000 barils un volume presque égal à celui qui est produit par jour dans le champ du Texas Est en pétrole brut. Un groupe de cette taille fait circuler environ 380.000 barils par jour.

TOURS DE FRACTIONNEMENT

On a apprté relativement peu de changement dans le tracé des tours de fractionnement qui desservent ces groupes combinaisons modernes. Les tours sont du type classique à barbotage par calottes et plateaux, le retour étant assuré au sommet en faisant revenir une portion liquéfiée des fractions de tête, et la marche de la tour est entièrement automatique.

Les installations récentes exigent de grandes tours et il semble que les facilités dont disposent les fabricants de plaques d'acier ainsi que les chemins de fer et navires sont les seuls facteurs qui imposent une limite à l'ampleur actuelle des exigences de raffineries.

Dans les cas où on est en présence de pétroles ou vapeurs corrosives, il est devenu courant d'introduire par force à l'intérieur des tours un revêtement à l'épreuve de la corrosion, ou de l'y souder en place. Quand on ne fait pas cella, on portège en général le corps de tour en injectant de l'ammoniac dans l'espace à vapeurs.

CONDENSEURS ET ECHANGEURS

Les condenseurs et les échangeurs qui desservent les groupes combinaisons jouent un rôle très important. Etant donné que le principe du groupe combinaison est d'établir la portion de

instalaciones utilizan dos o más hornos o serpentines.

Mucho mayor flexibilidad se provee mediante la operación de serpentines separadamente calentados, y la tendencia ha sido hacia incluir tantos serpentines en la instalación de combinación como el número de operaciones separadas que hay por hacer.

PROYECTO DE LOS CALEN TADORES

Cada uno de estos serpentines está proyectado para manejar de la mejor manera posible el servicio a que se destina, estando su construcción gobernada por la intensidad del calor, presión y capacidad. El principio del horno de calor central ascendente fué utilizado en varias de estas instalaciones de combinación. En la elección de tubos para los calentadores se presenta la tendencia a instalar tubos ordinarios de acero al carbón, en todo caso en que puedan resistir las presiones y las temperaturas presentes.

Por lo menos en una de las más recientes instalaciones de horno, que exigía aceros de gran resistencia a las altas temperaturas, se emplearon tubos reforzados por recalcadura en los extremos. Estos tubos se fabrican de un modo que se hace innecesaria la laminación, con cada extremo admitiendo una conexión de acoplamiento especial.

Casi sin excepción, los hornos más grandes están completamente soportados en armazones de acero, con las paredes suspendidas y enfriadas por el aire entrante, que se emlea en la combustión.

Se emplean materiales de mayores propiedades refractarias y el gobierno de los gases calientes de la combustión, que pasan por el horno, se ha hecho tan exigente, que casi se elimina la formación de coque o el desarrollo de zonas recalentadas.

BOMBAS

Las bombas que se emplean en estas instalaciones de combinación varían también mucho en lo tocante a tipo y capacidad, dependiendo del servicio determinado a que se dedica cada una. La bomba de carga de tipo alternativo de lento movimiento ha resultado muy popular, a causa de su acción positiva. Las bombas centrífugas, accionadas por motor eléctrico o por turbinas de vapor o de gas, son las que más se emplean en las más recientes instalaciones, para la transferencia de los petróleos o como bombas de reflujo.

Donde hay que transferir petróleos calientes o corrosivos, las piezas de la bomba, que quedan en contacto con el petróleo, se hacen de aleaciones de gran resistencia al calor y corrosión. A causa de que una gran parte del trabajo hecho en las instalaciones de combinación, tiene necesariamente que pasar por las bombas, se da atención muy especial a la construcción de las bombas por emplearse en cada una de estas nuevas instalaciones. La importancia de las bombas puede apreciarse teniendo presente lo siguiente: por las bombas de una sola instalación de combinación de 36.000 barriles al día pasa tanto petróleo como la cantidad total de petróleo crudo extraída al día en los campos petrolíferos de East Texas. Por una instalación de esta capacidad circulan diariamente 380.000 barriles de petróleo.

TORRES DE DESTILACION FRACCIONADA

Comparativamente poco cambio se ha hecho en la construcción de las torres de destilación fraccionada que se emplean en estas modernas instalaciones de combinación. Las torres siguen el principio corriente de cúpola y bandeja de burbujeo, con el reflujo suministrado arriba, por el regreso de una porción líquida del destilado de cabeza, y con el gobierno general de la torre completamente automático.

Las nuevas instalaciones están exigiendo torres grandes y parece que las facilidades de los fabricantes de láminas de acero y las de transporte de los ferrocarriles y vapores son los únicos factores que limitan el presente tamaño de estos requisitos de las refinerías modernas.

Donde se presentan petróleos o vapores corrosivos, se ha hecho prática común embutir o sol-

interior of towers. Where this is not done the tower shell is usually protected by injecting ammonia into the vapor space.

CONDENSERS AND EXCHANGERS

The condensers and exchangers serving the combination units play a very important part. Since the principle of the combination units involves establishing the cracking portion as the primary operation and then utilizes the waste heat to carry on the normal skimming operation, it becomes self-evident that large, dependable and efficient exchangers are essential.

Inasmuch as a large portion of the transfer of oils through the system is done under natural or at high pump pressures, the exchanger parts have had to be made of relatively heavy materials. The tendency for hot corrosive vapors to attack the cooler portions of the exchanger tubes has often made it necessary to build the tubes out of especially strong and corrosion resisting metals. The choice of metal for the tubes has usually followed cut-and-try methods and the most expensive alloys have not always been the most successful.

As may be expected, the nature of the work done by combination units calls for the increasing use of vapor to liquid exchangers and in some instances—vapor to vapor exchanges. In such instances abnormally high pressures are usually involved and the design of the exchangers is special for the particular installation. Ammonia is also extensively used as a means of combating corrosion in the condenser and exchangers of a combination unit.

Despite the many precautions taken to avoid tube failures, it has become standard practice to include excess exchanger capacity in each unit and to locate the exchangers in an accessible place so that each exchanger unit may be by-passed and repairs made to any one of them without shutting down the entire combination unit. Obviously, a leak in one exchanger may be of more or less importance than a leak in another so the degree of accessibility is determined by the nature of the service.

POWER

Considerable power is needed to drive all of the pumps utilized in charging a large combination unit and more power is used in making the oil transfers within the unit. The power demands of a single 30,000 bbl., combination unit exceeds the needs of a city of 50,000 people, if based upon an electric power basis.

Most of the electric power consumed in the larger installation, is generated on the refinery site from gases, coke or fuel oil that would otherwise have been sold at very low prices.

As refiners find ways and means for converting these gases into motor fuel by polymerization or make less coke and fuel oil as a result of improved cracking results, the trend will probably be in the direction of purchasing electric power from utility companies.

Where an excess of fuel exists at the refinery, it has been common practice to utilize this in making high pressure steam which is passed through turbines which in turn drove the electric generators, the turbines exhausting the steam under sufficiently high pressure to be utilized for the operation of pumps or as process steam. This principle is being utilized in at least one large new refinery equipped with a combination unit.

cracking comme opération primaire, puis d'utiliser la chaleur résiduaire pour effectuer la distillation non poussée normale, il devient évident que de grands échangeurs sûrs et efficaces sont ici essentiels.

Etant donné qu'une bonne partie du transfert des pétroles à travers le système se fait par pression naturelle ou par forte pression de pompe, les pièces d'échangeurs ont dû être faites de matières assez résistantes. La tendance qu'ont les vapeurs corrosives chaudes d'attaquer les parties plus froides des tubes échangeurs a souvent obligé à faire usage de tubes en métaux d'une grande ténacité et d'une grande résistance à la corrosion. Le choix du métal pour les tubes a suivi en général des méthodes toutes faites et les alliages les plus coûteux ne sont pas toujours ceux qui ont le mieux réussi.

Comme on peut le deviner, la nature du travail effectué par les groupes combinaisons demande un emploi croissant d'echangeurs entre vapeurs et liquides et dans certains cas des échangeurs entre vapeurs et vapeurs. Dans de tels cas on se trouve en général en présence de pressions particulièrement élevées, de sorte que le tracé des échangeurs est adapté à chaque installation individuelle. On emploie aussi beaucoup l'ammoniac aux fins d'enrayer la corrosion dans le condenseur et les échangeurs des groupes combinaisons.

Malgré toutes les précautions prises pour prévenir les pannes de tubes, on a cru devoir adopter comme pratique standard de prévoir un excès de capacité d'échangeurs dans chaque groupe et de situer les échangeurs à un endroit accessible afin de pouvoir mettre s'il y a lieu chaque groupe en dérivation et de pouvoir faire des réparations à l'un quelconque d'entre eux sans devoir arrêter tout le groupe combinaison. Il es évident qu'une fuite à un échangeur peut être d'une importance plus ou moins grande que cella d'une fuite à un autre échangeur, de sorte que le degré d'accessibilité est fixé par la nature du service.

FORCE MOTRICE

Une force motrice considérable est nécessaire pour actionner toutes les pompes utilisées pour charger un grand groupe combinasion, et une force motrice encore plus forte est demandée pour faire les transferts de pétrole à l'intérieur du groupe. Les besoins en force motrice d'un seul groupe combinaison de 36.000 barils dépassent ceux d'une ville de 50.000 âmes, si l'on se base sur la force motrice électrique.

La majeure partie de la force électrique qui se consomme dans les grandes installations est générée sur le site de la raffinerie à partir de gaz, de coke ou de fuel oïl qui autrement se seraient vendus à de vils prix.

A mesure que les raffineurs mettent au point des procédés plus efficaces pour convertir ces gaz en carburant moteur par polimérisation ou pour réduire la formation de coke ou de fuel oïl par amélioration des méthodes de cracking, il est probable que la tendance sera d'acheter la force électrique auprès des compagnies électriques.

Quand on dispose d'un excès de carburant à la raffinerie, il est devenu d'un usage courant d'en tirer parti pour produire de la vapeur à haute pression qu'on fait passer à travers des turbines qui à leur tour actionnent les dynamos électriques, ces turbines épuisant la vapeur sous pression suffisamment élevée pour servir à la marche des pompes ou comme vapeur de traitement. Ce principe est appliqué au moins dans une des grandes raffineries nouvelles équipées d'un groupe combinaison.

RENDEMENTS ET PRODUITS

Le sujet des groupes combinaisons a été examiné ici en tant que moyen moderne et dominant pour préparer l'essence.

Il est évident que le caractère très complet de ces groupes permet aussi la fabrication d'autres produits. Les rendements de chacun de ces produits ne sont pas seulement fonction du tracé du matériel employé, mais aussi du pétrole brut qu'on traite.

En général, on a construit ces groupes de manière à obtenir la majeure partie de leur débit en essence comme produit à indice octane de 65 à 70 et point maximum de 400. En pratique, on recueille plusieurs courants d'essence, dont chacun peut être considéré comme un produit fini au point de vue des caractéristiques de distillation, ou encore peut être mélangé.

dar forros de gran resistencia al ataque corrosivo en el interior de las torres. Cuando no se hace ésto, la pared o casco de la torre se portege generalmente por inyecciones de amoniaco en el espacio o cámara del vapor.

CONDENSADORES Y CAMBIADORES

Los condensadores y cambiadores desempeñan papel muy importante en estas instalaciones de combinación. Como el principio de estas instalaciones de combinación comprende el establecimiento de la extracción por "cracking" como la operación primaria y utiliza luego el calor sobrante para la realización de la normal destilación sin presión, resulta evidente que el empleo de cambiadores grandes, seguros y eficaces es cosa muy esencial.

En vista de que una gran parte de la transferencia de los petróleos, por el sistema, se hace bajo presiones naturales o de bombas de gran fuerza, las piezas de los cambiadores han tenido que hacerse de materiales relativamente firmes. Como los vapores calientes corrosivos tienen la tendencia a atacar las porciones más frías de los tubos de los cambiadores, ésto ha impuesto la necesidad de hacer los tubos de metales muy firmes y de gran resistencia a la corrosión. La elección del metal para los tubos se hace con sumo cuidado, en vista de ensayos prácticos, y por esta razón, las aleaciones más costosas no siempre han dado los mejores resultados.

Como es de esperarse, el caracter del trabajo que hacen las instalaciones de combinación exige un creciente empleo de vapor en los cambiadores líquidos y en algunos casos, enntre cambiadores de vapor. En semejantes casos, se presentan presiones anormalmente grandes, y la construcción de los cambiadores se adapta especialmente a la instalación en que se utilizan. También se emplea mucho el amoniaco, como medio de combatir la corrosión en los condensadores y cambiadores de las instalaciones de combinación.

A pesar de las muchas precauciones que se toman para evitar la falla de los tubos, se ha hecho práctica corriente incluir un exceso de capacidad de cambiadores en cada instalación y colocar los cambiadores en puntos de fácil acceso, a fin de que cada cambiador individual pueda aislarse del sistema, para su reparación, sin que por ésto se interrumpa o paralice la operación de toda la instalación. Por su puesto, un escape en un cambiador puede ser de mayor o menor importancia que el escape en otro, y es por esto que el grado de accesibilidad de los cambiadores se determina por el caracter del servicio que prestan individualmente.

FUERZA MOTRIZ

Se necesita mucha fuerza para hacer funcionar todas las bombas que se utilizan en cargar una instalación de combinación grande y también se requiere mucha fuerza para la transferencia del petróleo dentro de la instalación. Los requisitos de fuerza motríz de una sola instalación de combinación de 30.000 barriles diarios de capacidad exceden a los de una ciudad de 50.000 habitantes, si se computan sobre base de potencia eléctria.

Casi la mayor parte de la fuerza eléctrica consumida en las grandes instalaciones se genera en el punto de la refinería, de gases, coque o aceite combustible, que de otro modo podrían venderse a precios muy bajos.

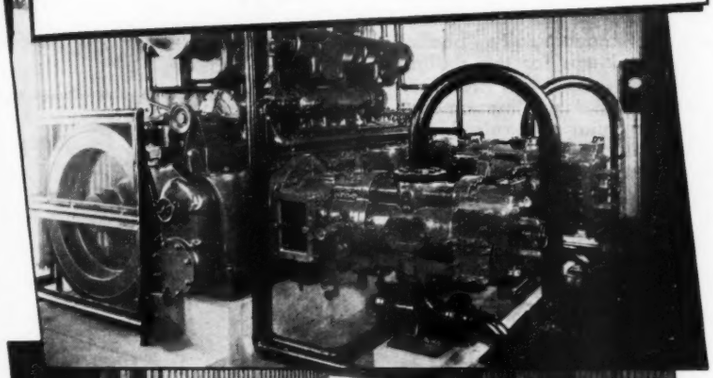
A medida que los refinadores descubran medios de convertir estos gases en combustible de motor, por polimerización, o hagan menos coque y aceite combustible como resultado de algún perfeccionamiento en el procedimiento de "cracking," se presentará entonces la tendencia hacia la compra de fuerza motríz de las centrales de fuerza que la venden al público.

Cuando en la refinería se presenta un exceso de combustible, se sigue la práctica de utilizarlo en la generación de vapor de alta presión, el cual es pasado por las turbinas, las cuales, a su turno, han dado movimiento a los generadores eléctricos. Las turbinas descargan el vapor a una presión bastante alta para poder se utilizado en la operación de las bombas o en otros trabajos de la instalación. Este principio se está siguiendo por lo menos en una de las nuevas instalaciones de combinación.

65 TYPES and SIZES of ENGINES and COMPRESSORS are built by COOPER-BESSEMER

65 TYPES et TAILLES de MOTEURS et COMPRESSEURS sont construits par COOPER-BESSEMER

65 TIPOS Y TAMANOS DE MOTORES Y COMPRESORES se construyen por la COOPER-BESSEMER



COMPRESSING GAS. This Angle Compressor Unit is a Type G-MR-3, 225-H.P., two-cycle, three-cylinder unit owned by Continental Oil Company.

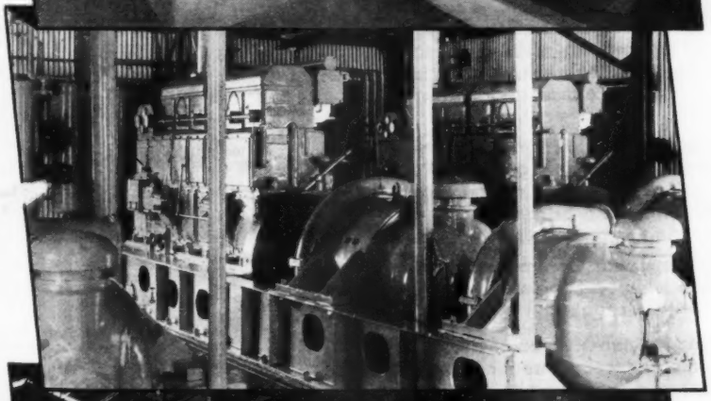
COMPRESSION DE GAZ. Ce groupe compresseur à angle est un groupe à trois cylindres, deux temps, 225 H.P., Type G-MR-3, qui appartient à la Continental Oil Company.

COMPRESION DE GAS. Este grupo compresor en ángulo es un modelo de tres cilindros, de dos ciclos o tiempos, de 225 c. de f., de tipo G-MR-3, perteneciente a la Continental Oil Company.

PUMPING OIL WELLS. This Vertical Pumping Engine is a Type G-SD, 40-60 H.P., two-cycle, twin-cylinder unit owned by Tidewater Oil Company.

POMPAGE DE PUITS DE PETROLE. Ce moteur vertical de pompage est un groupe à cylindres jumelés, deux temps, 40-60 H.P., Type G-SD, qui appartient à la Tidewater Oil Company.

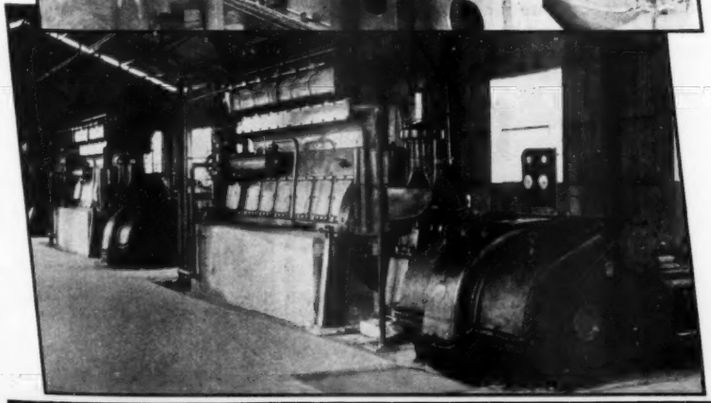
BOMBEO DE POZOS DE PETROLEO. Esta bomba mecánica vertical es un modelo de cilindros gemelos, de dos tiempos o ciclos, de 40-60 c. de f., de tipo G-SD, propriedad de la Tidewater Oil Company.



DRILLING OIL WELLS. These three Diesel-Electric Sets are Type FP-6, 240-280 H.P., four-cycle, six-cylinder units operating on a power barge owned by Standard Oil Company of Venezuela, S. A.

FORAGE DE PUITS DE PETROLE. Ces trois groupes électriques Diesel sont des groupes à six cylindres, quatre temps, de 240-280 H.P., Type FP-6, qui fonctionnent sur un chaland à moteur appartenant à la Standard Oil Company of Venezuela, A. du Sud.

PERFORACION DE POZOS DE PETROLEO. Estos tres grupos eléctricos diésel son modelos de seis cilindros, de cuatro ciclos o tiempos, de 240-280 c. de f., de tipo FP-6, que funcionan en un lanchón a motor de la Standard Oil Company de Venezuela, S.A.



PIPE-LINE PUMPING. These six Diesel Engines are Type JT-6, 300-350 H.P., four-cycle, six-cylinder units direct-driving reciprocating oil pumps for Anglo-Mexican Petroleum Corp., Mexico.

POMPAGE DE PIPE-LINES. Ces six moteurs Diesel sont des groupes à six cylindres, de quatre temps, 300-350 H.P., Type JT-6, qui actionnent par commande directe des pompes alternatives à pétrole pour la Anglo-Mexican Petroleum Corp., Mexique.

BOMBEO DE TUBERIA DE TRANSPORTE. Estos seis motores diésel son modelos de seis cilindros, de cuatro ciclos o tiempos, de 300-350 c. de f., de tipo JT-6, que dan propulsión directa a bombas alternativas, en una instalación de la Anglo-Mexican Petroleum Corp. en México.

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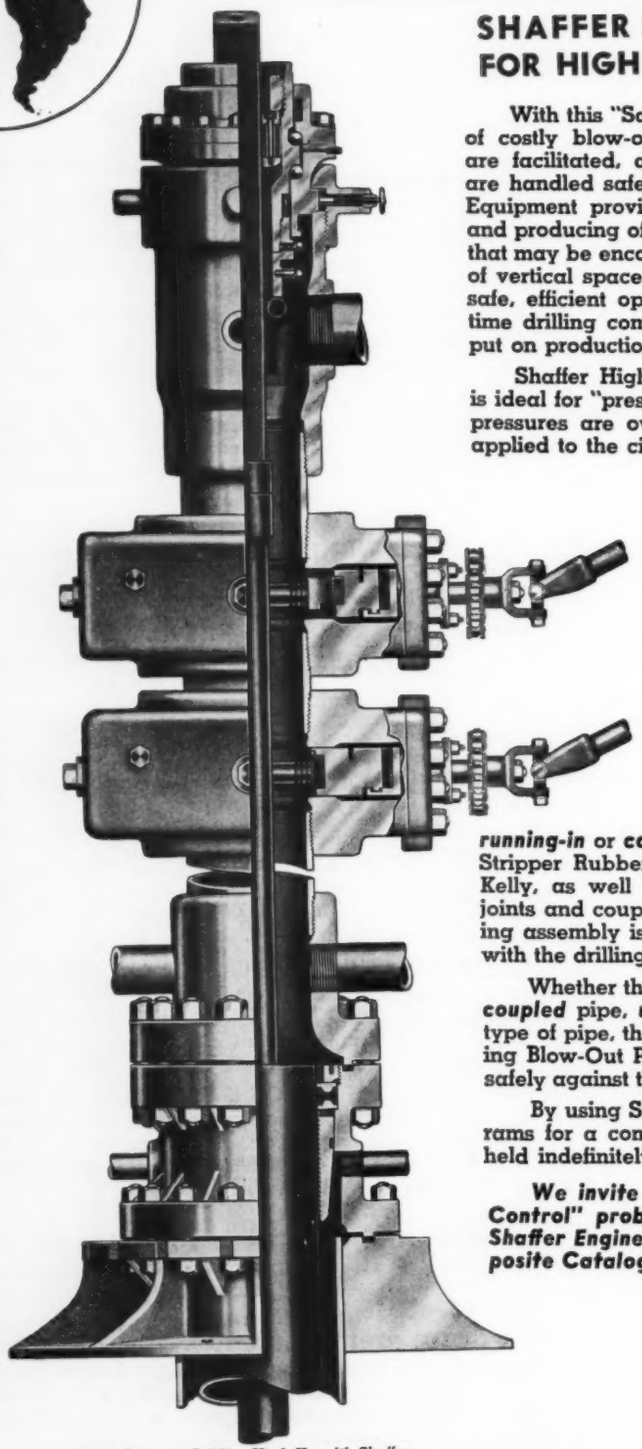

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With the new Shaffer Combination Rotating Blow-Out Preventer and Stripper, positive protection is provided at ***all*** times ***while drilling***, when ***running-in*** or ***coming-out*** of the hole. The new Stripper Rubber packs off around the square Kelly, as well as around the drill pipe, tool joints and couplings. The entire internal packing assembly is readily released and removed with the drilling bit.

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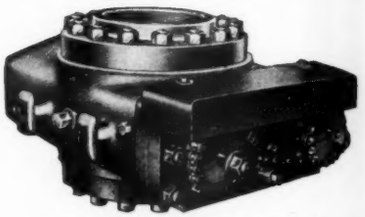
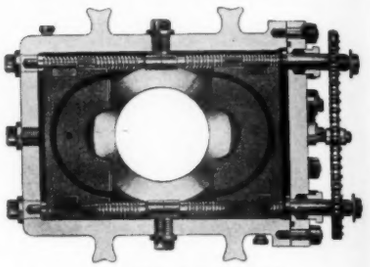
We invite you to submit your "Pressure Control" problems for recommendations by Shaffer Engineers; and refer you to the Composite Catalog for specifications and details.

Pelton Wheel and Hand Wheel Combination for mechanical or manual closing of Shaffer Cellar Control Gate

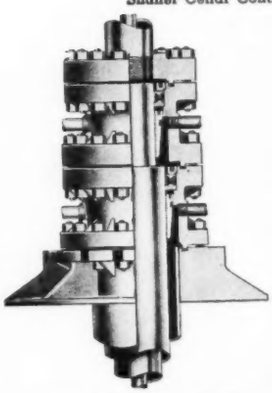
Shaffer Universal Tubing Control Head



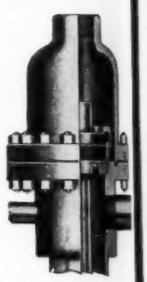
Shaffer Cellar Control Gate—Flange Type



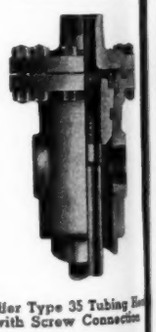
Looking down through Shaffer Cellar Control Gate



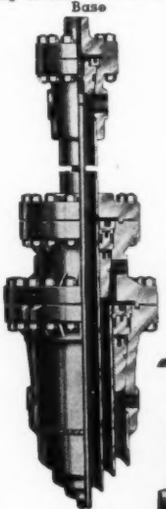
Class B Spool Type Landing Heads with Landing Base



Warren Control Hea

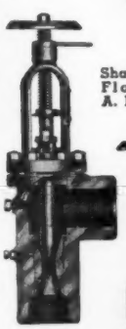


Shaffer Type 35 Tubing He with Screw Connection



Shaffer Full Opening Spool Type Landing Head

Shaffer Tubing Gate



Shaffer Adjustable Flow Bean—Type 34

Shaffer Adjustable Flow Bean with A. P. I. Ring Joint Flanges

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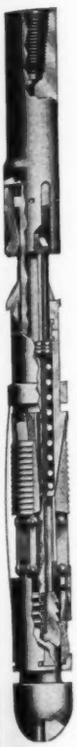
Space does not permit of detailed descriptions, but kindly refer to the complete Shaffer Section in the Composite Catalog, or write to the nearest office for a copy of the Shaffer Catalog.

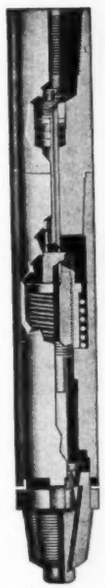


Shaffer Inside Casing Cutter

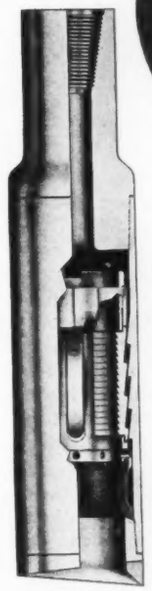
Shaffer Outside Drill Pipe Cutter

Shaffer Liner Hanger

Shaffer Double Bowl Rotary Releasing Socket

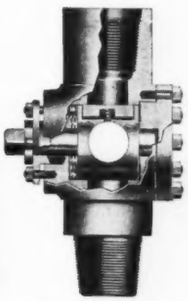


Shaffer Expanding Pin Tap



Shaffer T. & T. Rotary Releasing Socket

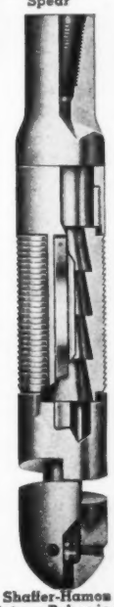
Shaffer Improved Water Test Packer



Shaffer Kelly Cock

Shaffer-Hamon Rotary Releasing Socket

Shaffer T. & T. Rotary Releasing Spear



Shaffer-Hamon Rotary Releasing Spear

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YEILDS AND PRODUCTS

Here the subject of combination units has been considered from the standpoint of being a major and modern means for making gasoline.

Obviously, the completeness of these units permits the manufacture of other products as well. The relative yields of these products are not only a function of the equipment design but of the crude oil processed.

In general, these units have been designed to make the bulk of their gasoline output as a 400 endpoint 65 to 70 octane product. In actual operation, several gasoline streams are recovered, each of which may be considered a finished product from the standpoint of distillation characteristics or may be blended.

If a separate straightrun gasoline stream is recovered it is usually of very low endpoint in order to conserve octane value and thus low endpoint straightrun material is often utilized as an aircraft fuel because of its lesser tendency to form gum than cracked fuels of equal octane values. Obviously, the volume of such gasolines is relatively small and the market is also small.

Assuming that an average Mid-Continent crude is being processed through a combination topping and cracking plant, and the straightrun gasoline is blended with the cracked production, the composite motor fuel fraction would probably represent 65 per cent of the volume of crude charged and the octane value of the fuel would approximate 70 without the addition of lead tetraethyl.

VAPOR PHASE FILTERING

One decided advantage in the operation of large combination units has been the ease with which vapor phase treating may be applied. Clay towers have enabled refiners operating combination units to produce a finished motor fuel directly from the apparatus and in one installation at least 3,000,000 bbls., of gasoline have been treated by a single batch of clay. (100 tons).

STABLIZING EQUIPMENT

Somewhat as an optional part of a combination unit, as in the case of vapor phase treaters, the necessary exchangers and fractionators may be included for stabilizing the crude as it enters the combination unit or they may be utilized to stabilize the finished gasoline or the pressure distillates, if the latter is made.

Stabilizing the finished gasoline has become an essential step in its processing since the average modern motor car has a greater tendency to vapor-lock. This does not appear to be so much an inherent fault of the modern car as it is a matter of causing the car to vapor-lock through restricted radiator styling, greater engine power output and faster driving.

If the polymerization of ethane, propane and their insomers become a general procedure and are made a part of the combination unit of the future, stabilization of the gasoline will assume a new role. Instead of at present representing a means for ridding the gasoline of objectionable light fraction, the stabilizer equipment will operate as the collector of these fractions for further processing in the polymerization plant. Here these fractions will be broken down, re-united, and possibly hydrogenated to make one or another type of motor fuel.

(Continued on Page 252)

Si l'on recueille un flux séparé d'essence de distillation, il est en général d'un point maximum très bas afin de conserver sa valeur en octane, et ainsi on emploie souvent du produit de distillation à bas point maximum comme carburant d'aviation à cause de sa tendance moindre à former de la gomme que ce n'est le cas avec des carburants crackés de valeurs octane égales. Il est clair que le volume de ces essences est relativement faible et que les débouchés aussi sont limités.

Supposant qu'un pétrole brut moyen du Centre Américain soit traité dans une installation combinant la distillation primaire et le cracking, et qu'on mélange l'essence de distillation avec le produit de crackage, le carburant moteur en résultant représenterait probablement 65 pour cent du volume de pétrole brut chargé et la valeur en octane du carburant serait d'environ 70 sans l'addition de tétraéthyle de plomb.

FILTRAGE DE PHASE VAPEUR

Un avantage marqué qu'on doit à l'emploi de grands groupes combinaisons est la facilité avec laquelle on peut appliquer le traitement de phase vapeur. Des tours d'argile ont permits aux raffineurs de faire marcher les groupes combinaisons pour obtenir un carburant moteur fini directement sur l'appareil, et dans le cas d'une installation on a traité au moins 3.000.000 barils d'essence par un lot unique d'argile (100 tonnes).

MATERIEL DE STABILISATION

Plus ou moins comme organe facultatif d'un groupe combinaison, de même que dans le cas des traiteurs de phase vapeur, on peut prévoir des échangeurs et fractionneurs nécessaires pour stabiliser le pétrole brut à son entrée dans le groupe combinaison, ou peut y avoir recours pour effectuer la stabilisation de l'essence finie ou des distillés sous pression, s'il y a lieu.

La stabilisation de l'essence finie est devenue une opération essentielle de son traitement car l'automobile moderne courante a une plus grande tendance à emprisonner des poches d'air. Ceci n'est pas, semble-t-il, tant un défaut inhérent à l'automobile moderne que ce n'est une question de provoquer le blocage de poches d'air par suite de styles de radiateurs restreints, de plus grandes puissances de moteur et de plus grandes vitesses de conduite.

Si la polimérisation de l'éthane, du propane et de leurs isomères devient par la suite une méthode d'emploi général et devient partie du groupe combinaison, la stabilisation de l'essence aura un nouveau rôle à remplir. Alors qu'a présent il constitue un moyen de débarrasser l'essence des fractions légères indésirables, le matérial stabiliseur de l'avenir fonctionnera comme collecteur de ces fractions en vue d'un nouveau traitement dans l'atelier de polimérisation. Ici ces fractions seront désagrégées, recombinées et peut-être hydrogénées aux fins d'obtenir tel ou tel type de carburant moteur.

REGIMES DE MARCHE

Quand on les avait suggérés pour la première fois, les groupes combinaisons étaient considérés trop grands et trop compliqués pour permettre une souplesse de marche suffisante, et étaient parfois considérés comme peu pratiques par suite du fait que, chaque fois qu'une certaine partie du matériel était en panne ou avait besoin de nettoyage, il fallait démonter le tout.

Mais ce préjugé a été dissipé dès la mise en oeuvre de la pratique et même premiers groupes combinaison ne sont pas démontés plus qu'une fois tous les 2 à 6 mois, et la marche no cesse que peu de temps, variable selon les remplacements à faire.

Au lieu que les groupes combinaison deviennent impraticables pour la fabrication de l'essence, ils sont devenus des plus efficaces pour répondre aux demandes en carburants moteurs à haut indice octane; leur emploi a été trouvé des plus économiques et leur fonctionnement suffisamment souple pour permettre la fabrication d'un grand nombre d'autres produits. On en a prévu aussi des modèles de capacités assez réduites pour que le petit raffineur s'y intéresse.

(Continué sur Page 252)

RENDIMIENTOS Y PRODUCTOS

El tema de las instalaciones de combinación se ha considerado aquí desde el punto de vista de ser un importante y moderno medio de hacer gasolina.

Por supuesto, el hecho de que estas instalaciones sean tan completas permite la manufactura de otros productos, al mismo tiempo. Los rendimientos relativos de estos productos no són sólo una función del equipo sino también del petróleo tratado.

En general, estas instalaciones han sido proyectadas para hacer la mayor parte de su rendimiento de gasolina en la forma de un producto con punto final de 400 y con octanos de 65 a 70. En operación actual, se destilan varias clases de gasolina, y cada una puede considerarse como un producto acabedo, desde el punto de vista de la destilación, y susceptible de mezclarse.

Cuando se recupera un chorro separado de gasolina de esencia de destilación, ella es generalmente de muy bajo punto final para conservar su valor en octanos y por esta razón, el material de esencia de destilación de bajo punto final es a menudo utilizado como combustible para aeroplanos, debido a su menor tendencia a formar gomosidad, en comparación con los combustibles destilados bajo presión o "cracking" de iguales valores en octanos. Por supuesto, la cantidad de semejante gasolina es relativamente pequeña y su mercado muy limitado.

Asumiendo que un petróleo promedio de la región central se esté tratando en una instalación de combinación de destilación y cracking, y que la gasolina de esencia de destilación se mezcle con la producción bajo presión, la fracción del combustible de motor compuesto representaría probablemente 65 por ciento de la cantidad del petróleo crudo cargado y el valor de octano del combustible sería aproximadamente de 70 sin la adición de tetraetilio de plomo.

FILTRACION DE LA FASE DE VAPOR

Una importante ventaja en la operación de las grandes instalaciones de combinación ha sido la facilidad con que se puede aplicar el tratamiento de la fase de vapor. Las torres de arcilla o greda han permitido a los refinadores con instalaciones de combinación el producir un combustible de motor acabado directamente del aparato, y por lo menos, en una instalación, se han tratado como 3.000.000 de barriles de gasolina con una sola carga de greda (100 toneladas).

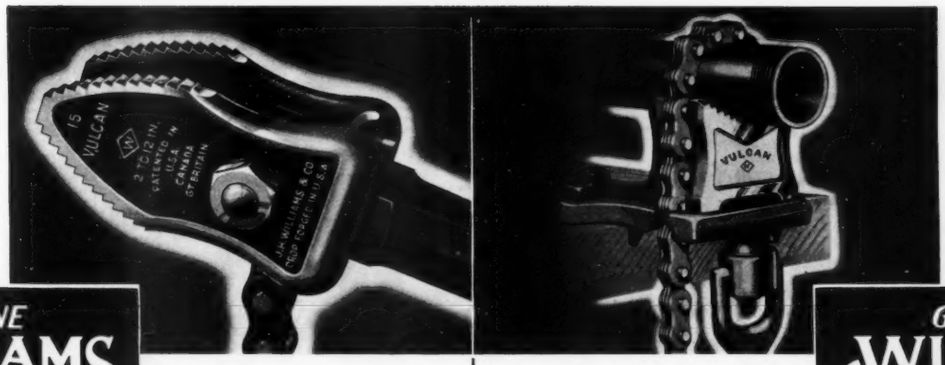
EQUIPO DE ESTABILIZACION

Generalmente como parte a elección de una instalación de combinación, como en el caso de los tratadores de la fase de vapor, pueden incluirse los necesarios cambiadores y fraccionadores, para la estabilización del petróleo crudo que entra en la instalación de combinación, o bien, para estabilizar la gasolina acabada o los destilados de presión, cuando estos últimos se comprenden también en el programa.

La estabilización de la gasolina acabada se ha hecho un paso esencial en su preparación, a causa de que el moderno vehículo automóvil tiene una mayor tendencia a la obturación por vapor. Esto no parece ser mucho una falta inherente del automóvil moderno, sino más bien asunto de provocar esta obturación por vapor en el sistema del combustible, a consecuencia la restricción impuesta por el estilo del radiador, mayor rendimiento de fuerza del motor y marcha más rápida.

En caso de que la polimerización del etano, propano y sus isómeros llegue a ser un procedimiento general y entre a formar parte de la instalación de combinación del futuro, la estabilización de la gasolina asumirá un nuevo rol. En lugar de representar, como lo hace al presente, un medio de quitar a la gasolina las fracciones volátiles inconvenientes, el equipo de estabilización funcionará como un colector de estas fracciones, para su adicional tratamiento en la instalación de polimerización. Una vez aquí, estas fracciones se separarán, se unirán de nuevo y posiblemente se hidrogenarán para hacer diversos tipos de combustible de motor.

(Continué en Página 252)



GENUINE WILLIAMS SUPERIOR DROP-FORGED TOOLS **"VULCAN" CHAIN PIPE TONG**

There are more Genuine Williams' "Vulcan" Tongs in the oil fields of the world than all other makes combined. The reason is superior performance! Made entirely of tough, wrought steel; all flat chains individually proof-tested and certified for safety. Nine sizes, for pipe 1/8″ to 18″. Fully guaranteed.

On trouve davantage de pinces "Vulcan" Williams authentiques dans les champs de pétrole du monde que de toutes les autres marques ensemble. La raison en est due à leur supériorité de fonctionnement! Tout en acier forgé, tenace; toutes les chaînes plates éprouvées individuellement et certifiées pour la sûreté. Neuf tailles, pour tuyau de ⅛ de pouce à 18 pouces. Garantie sans réserve.

En los campos petrolíferos del mundo hay más legítimas tenazas "Vulcan" de Williams que las de todas las demás marcas combinadas. La razón es, por supuesto, su excelente funcionamiento. Se hacen enteramente de firme acero forjado; todas las cadenas planas se ensayan individualmente para certificar su seguridad. Nueve tamaños, par tubos de ⅛ a 18". Guarantía completa.

GENUINE WILLIAMS SUPERIOR DROP-FORGED TOOLS **"VULCAN" CHAIN PIPE VISE**

Williams' "Vulcan", the *original* Chain Pipe Vise. Tough, wrought steel throughout (no castings), with *drop-forged* jaws, base and handle—light, compact, rapid—with positive grip. Four sizes, for pipe 1/8″ to 8 . Fully guaranteed.

L'étau de tuyau à chaîne "Vulcan" Williams *original*. Tout en acier forgé, tenace (pas de pièces coulées), avec mâchoires *forgées au marteau-pilon*, ainsi que la semelle et la manivelle—léger, compact, rapide—avec serrage positif. Quatre tailles, pour tuyau de ⅛ de pouce à 8 pouces. Garantie sans réserve.

El *original* tornillo o prensa "Vulcan" de Williams para tubo. De firme acero forjado, sin ninguna pieza fundida, con mandíbulas, base y mango de *acero forjado a martinete*—liviano, compacto rápido—con sujeción positiva. Cuatro tamaños, para tubos de ⅛ a 8". Completamente garantizado.

J. H. WILLIAMS & CO., *75 Spring St.,* NEW YORK, U.S.A.

Headquarters for: Drop-Forged Wrenches (Carbon and Alloy). Detachable Socket Wrenches, Reversible Ratchet Wrenches, "C" Clamps, Lathe Dogs, Tool Holders, Eye Bolts, Hoist Hooks, Thumb Nuts and Screws, Chain Pipe Tongs and Vises, etc.

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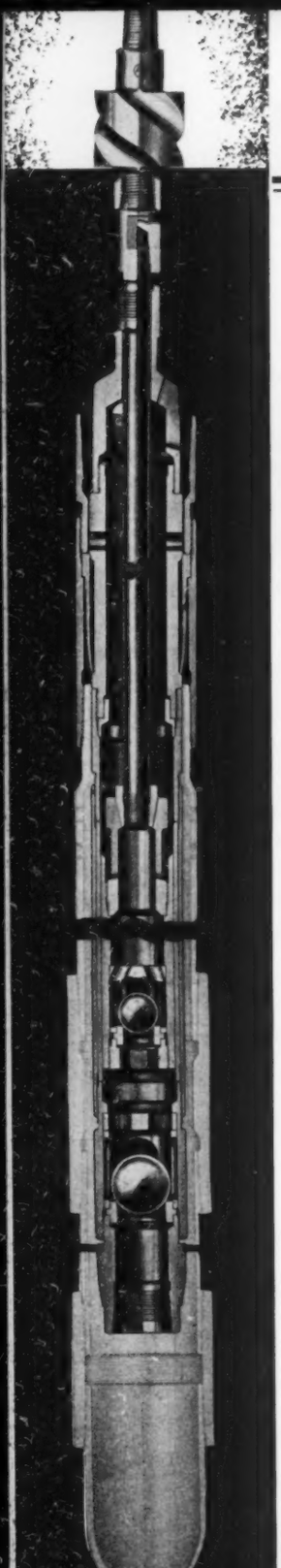


AXELSON PUMPS

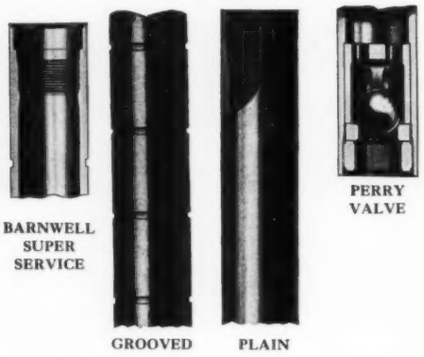
Axelson Pumps are classified under two basic types:—Tubing Pumps in which the pump barrel is run as part of the tubing string; and Rod Pumps which are installed or removed with the rods instead of the tubing. Axelson Pumps are available for all depths, capacities and conditions of production. Interchangeable parts permit a wide variety of assemblies.

POMPES AXELSON

Les pompes Axelson sont classées en deux types de base:—les pompes de tubage dans lesquelles le corps de pompe est descendu comme partie de la colonne de tubage; et les pompes de tiges qui sont installées ou enlevées avec les tiges au lieu du tubage. Les pompes Axelson sont prévues pour toutes profondeurs, capacités et conditions de production. Les pièces interchangeables permettent une grande variété de montages.

BOMBAS AXELSON

Las bombas Axelson se clasifican bajo dos tipos fundamentales: —bombas de tubería, en las cuales el cuerpo de la bomba desciende como parte de la columna de tubería; y las bombas de varilla, que se instalan o se quitan con las varillas, en lugar de la tubería. Las bombas Axelson se ofrecen para toda profundidad, capacidad y condición de producción. Las piezas intercambiables permiten una gran variedad de combinaciones.



AXELSON PLUNGERS

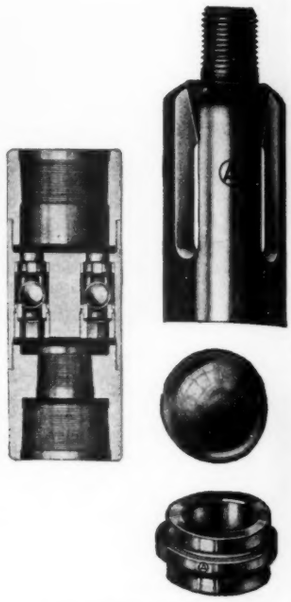
By the use of proper combinations of operating surface and design features, any pumping condition can be satisfactorily met by Axelson Plungers. Regular Steel Plungers serve well under ordinary conditions. Chromium Plated Plungers resist wear and corrosion. Grooved Plungers provide a sealing effect by turbulence in the grooves. Perry Valve (patented) reduces gas-locking to the absolute minimum. Super-Service Hardened Alloy Steel Grooved Plungers will overcome the most difficult operating conditions. Other types are available.

PLONGEURS AXELSON

Par l'emploi de combinaisons convenables de caractéristiques de surface opérante et de tracé, toute condition de pompage peut être satisfaite au moyen des plongeurs Axelson. Les plongeurs d'acier normaux sont parfaits dans les conditions courantes. Les plongeurs chromés résistent à l'usure et à la corrosion. Les plongeurs rainurés font hermétisation par turbulence dans les gorges. La vanne Perry (brevetée) réduit le blocage de gaz au strict minimum. Les plongeurs rainurés de super-service en acier spécial trempé satisfont dans les conditions d'emploi les plus dures. Aussi d'autres types.

BUZOS AXELSON

Por el empleo de convenientes características de superficie de operación y de trazado, todo condición de bombeo puede satisfacerse mediante los buzos o émbolos Axelson. Los bujes normales de acero son perfectos para las condiciones corrientes. Los buzos cromados resisten el desgaste y la corrosión. Los buzos ranurados ofrecen un cierre hermético por la turbulencia promovida en las ranuras. La válvula Perry, patentada, reduce a un mínimo absoluto la obturación del gas. Los buzos ranurados de super servicio, de acero especial endurecido, satisfacen las condiciones de funcionamiento más difíciles o exigentes. Hay también otros tipos.



AXELSON FITTINGS

Axelson Standing Valves, Top and Bottom Cages and Seats and Balls are offered in several different types, each with its specific advantages as to performance and cost. The Axelson Multiple Standing Valve shown above at the left provides larger fluid capacity, less ball lift, faster valve action and minimum space for gas. Cages have hardened guides and bumpers.

GARNITURES AXELSON

Les vannes d'aspiration, cages de sommet et de fond, sièges et rotules Axelson sont offerts en plusieurs types différents, chacun avec ses avantages particuliers en rendement et en prix. La vanne d'aspiration multiple Axelson représentée ci-dessus à gauche assure un débit de liquide plus fort, une levée moindre de rotule, une action de vanne plus rapide et un espace minimum pour le gaz. Les cages ont des guides et des butées durcies.

ACCESORIOS AXELSON

Las válvulas de aspiración, las jaulas de tope y fondo y los asientos y bolas Axelson se ofrecen en varios tipos diferentes, cada uno sus respectivas ventajas en rendimiento y en precio. La válvula de aspiración Axelson, tipo múltiple, mostrada arriba, a la izquierda, provee mayor capacidad de líquido, menos levantamiento de bola, una acción de válvula más rápida y un espacio mínimo para el gas. Las jaulas tienen guías y topes endurecidos.

AXELSON LINERS

Axelson Liners are made in several grades to cover the entire range from normal pumping conditions to the most severe as to abrasion and corrosion in the deepest wells. Regular Cast Iron, Hardened Cast Iron, Universal, Nitri-Cast-Iron and Super-Service Hardened Steel types are available. Nitri-Cast-Iron is five times as hard as ordinary cast iron and twice as hard as white iron.

CHEMISES AXELSON

Les chemises Axelson sont prévues en plusieurs qualités afin de répondre aux conditions les plus diverses depuis celles de pompage normal jusqu'à celles les plus dures pour l'abrasion et la corrosion dans les puits les plus profonds. Il est offert des types en fonte normale, en fonte trempée, universels, en fonte nitreuse et de super-service en acier trempé. La fonte nitreuse est 5 fois plus dure que la fonte ordinaire et 2 fois plus dure que le métal blanc.

FORROS AXELSON

Los forros o camisas Axelson se ofrecen en varias calidades, para responder a toda condición de trabajo, desde el bombeo normal hasta los requisitos más exigentes a causa del desgaste y corrosión en los pozos más profundos. Los ofrecemos en tipos normales de hierro fundido, de hierro fundido cementado, universal, de hierro fundido nitratado y de acero endurecido de super servicio. El hierro fundido nitratado es cinco veces más duro que el hierro fundido ordinario y dos veces más duro que el hierro blanco.

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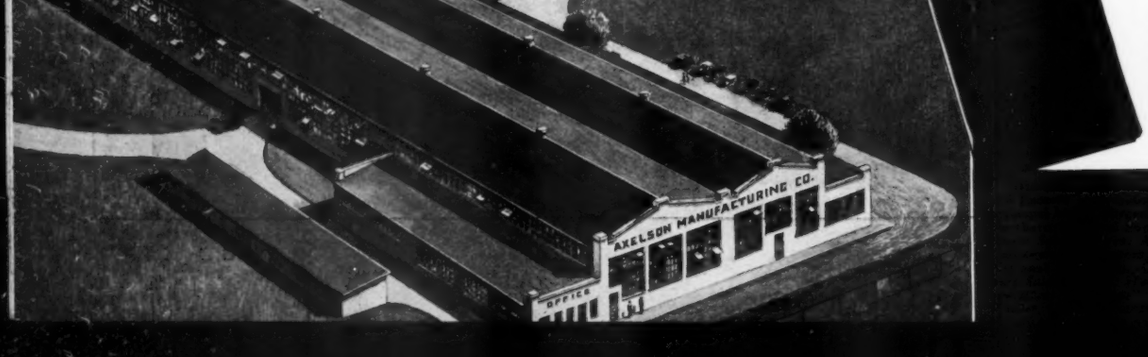
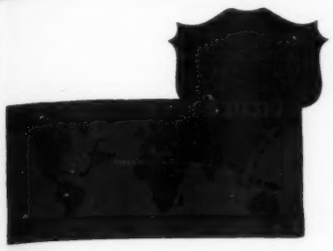
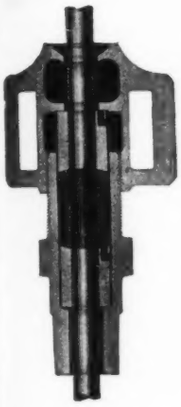


AXELSON PUMPS AND SUCKER RODS



For nearly half a century the Axelson Manufacturing Company has specialized in the design and manufacture of equipment for lifting petroleum from wells. The organization has been accorded international recognition for its knowledge and experience and is accepted as a leader in the development of oil production equipment. It has steadily kept in advance of the great changes that have taken place in production fields and has always been prepared to meet increasingly difficult conditions as they arose. When new products are introduced by Axelson they carry the assurance of tried and proven principles and materials and combine the results of alert initiative and mature judgment. Throughout the world, wherever petroleum is produced, Axelson representatives are stationed in all prominent oil fields and are fully prepared to analyze problems and furnish complete information.



AXELSON STUFFING BOXES

Simple in design, rugged, easy to pack and adjust, Axelson Stuffing Boxes efficiently and economically prevent leakage of oil around the polished rod. An oil reservoir at the top of the cap provides thorough lubrication for the polished rod, and is closed to prevent the entrance of foreign material. The body will last indefinitely as all wear is absorbed by the packing and followers. Adjustment is easily made by screwing cap down.

PRESSE-ETOUPES AXELSON

De construction simple et robuste, faciles à garnir et ajuster, les presse-étoupes Axelson sont efficaces et économiques pour prévenir les fuites de pétrole autour de la tige polie. Un réservoir d'huile au sommet du couvercle assure un graissage idéal de la tige polie, et est clos pour empêcher les matières étrangères de pénétrer. Le corps en durera indéfiniment car toute l'usure est absorbée par la garniture et les poussoirs. L'ajustage s'en fait facilement par vissage du couvercle vers le bas.

PRENSAESTOPAS AXELSON

De construcción sencilla y firme, fáciles de empacar y de ajustar, las prensaestopas Axelson son muy eficaces y económicas para evitar los escapes de petróleo alrededor de la varilla pulida. Un depósito de aceite, encima de la cabeza, asegura una lubricación ideal a la varilla pulida, y está tapado para evitar la entrada de substancias extrañas. El cuerpo dura indefinidamente, pues todo el desgaste recae en el grupo de la misma empaquetadura. El ajuste se hace fácilmente atornillando la cabeza.

AXELSON COUPLINGS

Axelson Hardened and ground Couplings have high wear resistance that increases the life of both couplings and well tubing. Several steps of heat treating and machining give an extremely hard, highly polished outer surface with soft but tough interior. Threads are perfectly aligned. The spiral flutes of the Guide Type Paraffin Scraper Coupling form a continuous bearing surface, yet allow adequate fluid passage. Turbulence set up by the flutes aids in expelling paraffin.

RACCORDS AXELSON

Les raccords Axelson durcis et rectifiés ont une grande résistance à l'usure qui prolonge la vie utile tant des raccords que du tubage de puits. Plusieurs phases de traitement thermique et d'usinage donnent une surface extérieure dure, d'un beau poli, avec intérieur tendre mais tenace. Les filetages sont parfaitement alignés. Les cannelures en spirale du raccord racleur de paraffine du type guide forment une surface portante continue, et pourtant laissent un passage de liquide suffisant. La turbulence provoquée par les cannelures aide à évacuer la paraffine.

ACOPLAMIENTOS AXELSON

Los acoplamientos Axelson endurecidos y pulidos tienen una gran resistencia al desgaste, lo que prolonga la duración efectiva de ellos mismos y de la tubería del pozo. Varias fases de tratamiento térmico y de labrado a máquina producen una superficie exterior muy dura y muy bien pulida, con un interior blando pero muy firme. Las roscas tienen perfecta alineación. La ranura en espiral del acoplamiento de raspador de parafina, tipo de guía, forma una continua superficie de contacto y permite, al mismo tiempo, un suficiente paso de líquido. La turbulencia provocada por la canalización ayuda a la expulsión de la parafina.

AXELSON ON-OR-OFF ATTACHMENT

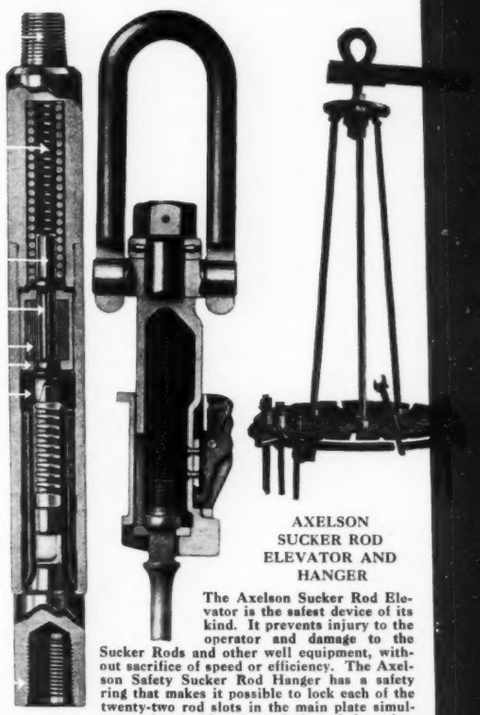
This patented attachment for connecting or disconnecting the sucker rods at the pump provides insurance against stripping jobs in any installation. This unit is made entirely of Axelson X-L corrosion-resisting steel. Coupling and uncoupling may be performed as often as desired without withdrawing the pump or plunger assembly from the well.

ADDITIF D'ACCOUPLEMENT ET DESACCOUPLEMENT

Cet additif breveté pour relier et séparer les tiges aspiratrices sur la pompe est l'assurance contre les opérations de dépouillage sur toute installation. Cet accessoire est tout en acier anti-corrosion Axelson X-L. L'accouplement et le désaccouplement peuvent se faire aussi souvent qu'on le désire sans retirer l'ensemble pompe ou plongeur du puits.

ADITAMIENTO DE CONEXION Y DESCONEXION

Este dispositivo patentado para unir y separar las varillas de aspiración en la bomba representa una sguridad contra serios accidentes en toda la instalación. Este aditamiento se hace enteramente de acero inoxidable Axelson X-L. La conexión y la desconexión pueden repetirse las veces que se quiera, sin quitar la bomba o el buzo del pozo.



AXELSON SUCKER ROD ELEVATOR AND HANGER

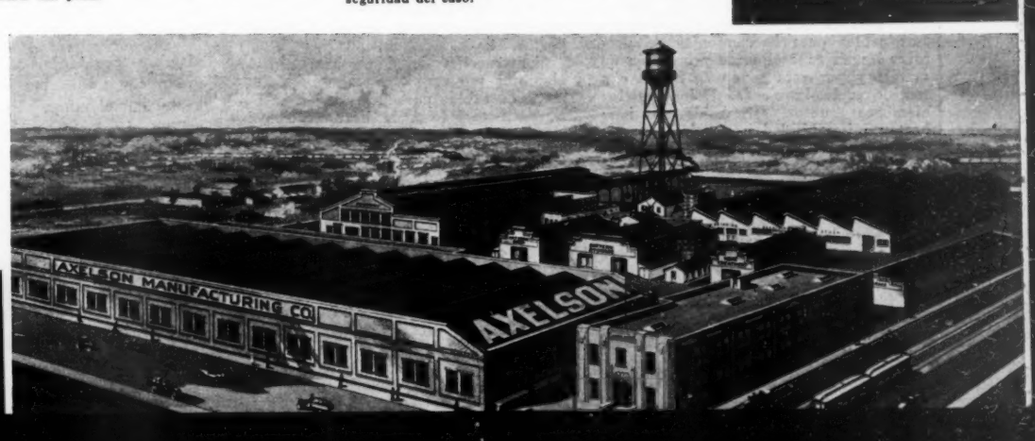
The Axelson Sucker Rod Elevator is the safest device of its kind. It prevents injury to the operator and damage to the Sucker Rods and other well equipment, without sacrifice of speed or efficiency. The Axelson Safety Sucker Rod Hanger has a safety ring that makes it possible to lock each of the twenty-two rod slots in the main plate simultaneously. Accidental revolution of the safety ring or disengagement of any of the rods suspended in the Hanger is impossible. Every safety feature is incorporated in both Elevator and Hanger.

ELEVATEUR et SUSPENDEUR DE TIGES ASPIRATRICES AXELSON

L'élévateur de tiges aspiratrices Axelson est le plus sûr dispositif de son genre. Il prévient les accidents à l'opérateur et les avaries aux tiges aspiratrices et autre matériel de puits, sans sacrifier la vitesse ou le rendement. Le suspendeur de sûreté Axelson de tiges aspiratrices a une bague de sûreté qui permet de bloquer chacune des 22 rainures de tiges dans la plaque principale à la fois. La bague de sûreté ne peut pas tourner par accident, pas plus qu'aucune des tiges suspendues dans le suspendeur ne peut se dégager. Tant l'élévateur que le suspendeur prévoient tous les dispositifs de sécurité possibles.

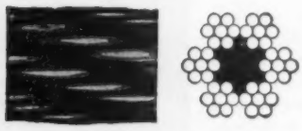
ELEVADOR Y COLGADOR AXELSON PARA VARILLA DE ASPIRACION

El elevador Axelson para varillas de aspiración es el dispositivo más seguro de su clase. Evita accidentes al operario y averías a las varillas de aspiración y otros equipos, sin menoscabo de la velocidad o del rendimiento. El colgador de seguridad Axelson, de varillas de aspiración, tiene un anillo de seguridad, que permite cerrar cada una de las veintidos ranuras en la placa principal de una manera simultánea. El anillo de seguridad no puede girar o desprenderse accidentalmente, y tampoco puede desconectarse ninguna de las varillas así retenidas. Tanto el elevador como el colgador tienen todos los rasgos de seguridad del caso.



UNION WIRE ROPE CORPORATION,

In Mexico: E. O. Chapa, Box 604, Tampico, Tamps, Mexico . . . Export Agents (except



6x7 CONSTRUCTION

USES: For Sand Lines, in ¼" to ¾" diameters; for coarse-laid Cable-Tool Drilling Lines, in ¾" to 1" diameters. For the oil industry, made only in Cast Steel and Mild Plow Steel.

Constructed of 6 strands of 7 wires each, laid around a hemp center. Sand Lines are made standard Right Lay. Cable-Tool Drilling Lines are used invariably with Manila Cracker and are consequently made Left Lay. Because of coarse wires, this rope lacks flexibility and elasticity but is preferred in drilling hard formations where abrasion is a large factor, or where corrosive conditions exist, as the large wires are particularly adapted to resist abrasion and corrosion.

CONSTRUCTION 6x7

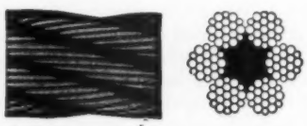
EMPLOIS: Pour câbles de sable, en diamètres de ¼ à ¾ de pouce; pour câbles de forage à outil sur câble de pose grossière, en diamètres de ¾ à 1 pouce. Pour l'industrie du pétrole, prévu seulement en acier coulé et en acier doux de charrue.

Structure de 6 torons de 7 fils chaque, autour d'un centre de chanvre. Les câbles de sable sont à commettage droit standard. Les câbles de forage pour outils sur câble sont chaque fois employés avec craqueur en Manille et sont par suite à commettage gauche. A cause des fils grossiers, ce câble manque de souplesse et d'élasticité, mais est préféré dans le forage de formations dures où l'abrasion est un facteur important, ou encore là où on se trouve en présence de corrosion, car les gros fils sont plus aptes à résister à l'abrasion et à la corrosion.

CONSTRUCCION 6x7

EMPLEOS: Para cables de arena, en diámetros de ¼ a ¾"; para cables de herramientas de perforación, en diámetros de ¾ a 1" de construcción gruesa. Para la industria del petróleo se ofrecen sólo en acero fundido y en acero dulce de arado.

Construcción de 6 torones, con 7 alambres por torón, con alma de cáñamo. Los cables de arena se ofrecen normalmente con torcido a la derecha. Los cables para herramientas de perforar llevan generalmente protección de manila y por esta razón se hacen con torcido a la izquierda. Debido a los alambres gruesos, este cable no tiene bastante flexibilidad y elasticidad y se prefiere para la perforación de formación bien duras, donde el rozamiento es un factor importante, o donde se presentan condiciones corrosivas, pues los alambres grandes están mejor adaptados a resistir el rozamiento y la corrosión.



6x19 WARRINGTON CONSTRUCTION

USES: For Cable-Tool Drilling Lines, in ⅝" to 1" diameters; Casing Lines, in ⅞" to 1⅛" diameters; Bailing Lines, in diameters specified by customers; occasionally used for Sucker Rod and Tubing Lines. Made for these purposes in Cast Steel or Mild Plow Steel, but mainly the latter,—except in case of Tubing or Sucker Rod Lines, which are made of Plow or Improved Plow Steel.

Constructed of 6 strands of 19 wires each, laid around a hemp center. Drilling Lines made either Right or Left Lay, according to practice in the given locality. Casing Lines are always Right Lay, Bailing Lines usually standard Right Lay. If used for Sucker Rod or Tubing Lines, usually made Left Lay.

CONSTRUCTION WARRINGTON 6x19

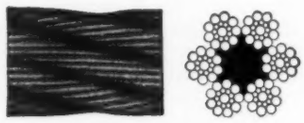
EMPLOIS: Pour câbles de forage pour outils sur câble, en diamètres de ⅝ de pouce à 1 pouce; câbles de revêtement, en diamètres de ⅞ de pouce à 1¼ pouce; câbles d'écopage en diamètres spécifiés par les clients; employés à l'occasion pour câbles de tiges aspiratrice ou de tubage. Prévus pour ces emplois en acier coulé ou acier doux de charrue, mais surtout ce dernier,—sauf dans le cas des câbles de tubage ou de tiges aspiratrices qui sont en acier de charrue ou en acier de charrue amélioré.

Structure de 6 torons de 19 fils chaque, autour d'un centre de chanvre. Les câbles de forage sont à commettage droit ou gauche, selon l'usage de la localité en vue. Les câbles de revêtement sont toujours à commettage droit, les câbles d'écopage en général à commettage droit standard. Si on les destine à servir de câbles de tubage ou de tiges aspiratrices, ils sont d'ordinaire à commettage gauche.

CONSTRUCCION WARRINGTON 6x19

EMPLEOS: Para cables de herramientas de perforación, en diámetros de ⅝ a 1"; cables de revestimientos, en diámetros de ⅞ a 1⅛"; cables de limpieza, en los diámetros indicados por el interesado. A veces se emplea también para varillas de aspiración y tubería. Para estos fines se hace de acero fundido o de acero dulce de arado, principalmente este último material—salvo en el caso de cables para tubería o para varillas de aspiración, en que se hace de acero de arado o de acero de arado perfeccionado.

Construcción de 6 torones, con 19 alambres por torón, con alma de cáñamo. Los cables para perforación se hacen con torcido a la derecha o a la izquierda, según la práctica que se siga en la localidad. Los cables para revestimientos tienen siempre torcido a la derecha, y los cables de limpieza llevan generalmente torcido a la derecha. Cuando se emplean para varillas de aspiración o de tubería, llevan generalmente torcido a la izquierda.



6x19 SEALE CONSTRUCTION

USES: For Rotary Drilling Lines, in certain localities, in ⅞" to 1⅛" diameters. For these lines, made only in Plow Steel and Improved Plow Steel grades.

Constructed of 6 strands of 19 wires each, laid around either a hemp center or an independent wire rope center. This construction employs coarse wires on the outside for heavy abrasion and resistance to drum crushing, and is preferable where these conditions exist, to the more flexible Warrington Construction. These Rotary Lines are invariably made standard Right Lay.

CONSTRUCTION SEALE 6x19

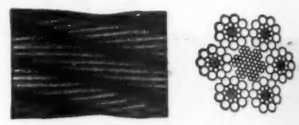
EMPLOIS: Pour câbles de forage rotatif, dans certaines localités, en diamètres de ⅞ de pouce à 1⅛ pouce. Pour ces emplois, il n'est prévu que l'acier de charrue et l'acier de charrue amélioré.

Structure de 6 torons de 19 fils chaque, autour d'un centre de chanvre, ou d'un centre indépendant de câble. Cette structure emploie des fils grossiers à l'extérieur contre une forte abrasion et pour résister à l'écrasement de tambour, et est préféré dans ces cas là à la structure Warrington plus souple. Ces câbles de rotatif sont toujours à commettage droit standard.

CONSTRUCCION SEALE 6x19

EMPLEOS: Para cables de perforación rotativa, en ciertas localidades, en diámetros de ⅞ a 1⅛". Para estos servicios, los cables presentes se hacen sólo de acero de arado y de acero de arado perfeccionado.

Construcción de 6 torones, con 19 alambres por torón, con alma de cáñamo o con un núcleo independiente de cable de alambre. Esta construcción utiliza alambres gruesos para el exterior, para resistir el gran rozamiento y tensión que recibe del tambor, siendo mejor para esta clase de trabajo, que la construcción Warrington más flexible. Estos cables rotativos se ofrecen normalmente con torcido a la derecha.



6x19 FLEXIBLE SEALE

With Independent Wire Rope Center

USES: For Rotary Drilling Lines, in 1" and 1⅛" diameters. Made only in the Improved Plow Steel grade.

Constructed of 6 strands, of a modified 19-wire Seale type, with Independent Wire Rope Center for heaviest duty, but also made with Hemp Center for more moderate duty. Invariably made standard Right Lay. This type of Rotary line was introduced by UNION in the oil industry for heaviest Rotary duty, to resist heaviest abrasion and drum crushing yet give as great a degree of flexibility as possible.

FLEXIBLE 6x19 SEALE CONSTRUCTION

EMPLOIS: Pour câbles de forage rotatif, en diamètres de 1 et 1⅛ pouce. Prévu uniquement en acier de charrue amélioré.

Structure de 6 torons d'un type Seale à 19 fils modifié, avec centre de câble indépendant pour service ultra-dur, mais aussi prévu avec centre de chanvre pour service moyen. Toujours fait en commettage droit standard. Ce type de câble rotatif a été introduit par UNION dans l'industrie du pétrole pour résister à la forte abrasion et à l'écrasement de tambour, tout en offrant le plus de souplesse possible.

CONSTRUCCION FLEXIBLE SEALE 6x19

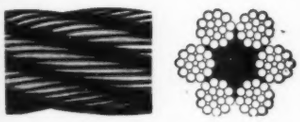
EMPLEOS: Para cables de perforación rotativa, en diámetros de 1 a 1⅛". Se hace sólo de acero de arado perfeccionado.

Construcción de 6 torones, con 19 alambres por torón de estilo Seale modificado, con núcleo o centro de cable de alambre independiente, para el trabajo más pesado, o bien, con alma de cáñamo, para trabajos menos exigentes. Invariablemente se ofrece con torcido a la derecha. Este tipo de cable para perforación rotativa fué introducido por la UNION a la industria del petróleo, para el trabajo de perforación rotativa más difícil y pesado, para resistir el mayor rozamiento y tensión de tambor, y dar, al mismo tiempo, el mayor grado posible de flexibilidad.

Both Ordinary and Preformed (UNION-Formed) Types.

KANSAS CITY, MISSOURI, U. S. A.

Mexico): Lucey Export Corp., Woolworth Bldg., New York; Broad Street House, London



6x16 FILLER WIRE CONSTRUCTION

USES: For Rotary Drilling Lines, in 1" and 1⅛" diameters. Made usually in Improved Plow Steel grade.

Constructed of 6 strands of 16 main wires each, usually with Hemp center, but also ordered at times with Independent Wire Rope Center. Invariably made standard Right Lay. Recommended for medium duty in Rotary drilling, as this is a relatively firm strand type for moderately heavy stresses and drum crushing. Not so well adapted for heaviest Rotary drilling, as it will not stand drum crushing, as well as the Seale.

CONSTRUCTION A FIL TAMPON DE 6x16

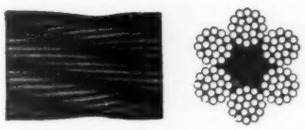
EMPLOIS: Pour câbles de forage rotatif, en diamètres de 1 et 1⅛ pouce. En général prévu en acier de charrue amélioré.

Structure de 6 torons de 16 fils principaux chaque, en général à centre de chanvre, mais parfois demandé avec centre de câble indépendant. Toujours à commettage droit standard. Recommandé pour service moyen de forage rotatif, car c'est un type relativement ferme de torons pour efforts moyennement forts et écrasement de tambour. Ne convient pas tant au forage rotatif très dur, car il ne résiste pas aussi bien à l'écrasement de tambour que le Seale.

CONSTRUCCION DE ALAMBRE FLEXIBLE 6x16

EMPLEOS: Para cables de perforación rotativa, en diámetros de 1 a 1⅛". Se hace generalmente de acero de arado perfeccionado.

Construcción de 6 torones, con 16 alambres principales por torón, generalmente con alma de cáñamo, pero suministrado también, a solicitud, con núcleo o centro independiente de cable de alambre. Invariablemente se ofrece con torcido a la derecha. Se recomienda para perforación rotativa de mediana intensidad, pues el tipo de torón empleado es relativamente firme para tensiones de tambor y rozamiento que no sean muy grandes. No se adapta muy bien a perforación rotativa muy pesada, a causa de que no puede resistir, en este caso, la tensión del tambor, tan bien como el de construcción Seale.



6x19 FILLER WIRE CONSTRUCTION

USES: For Rotary Drilling Lines, ⅞" and 1" diameters. Made usually in Plow Steel grade though occasionally ordered in Improved Plow Steel grade. Occasionally used for Sucker Rod and Tubing Lines, Left Lay, Hemp Center, Plow or Improved Plow grades.

Constructed of 6 strands of 19 main wires each, with Hemp center. Invariably made standard Right Lay. Recommended for lightest Rotary duty as it is more flexible and especially well adapted for high speeds and lighter loads, but is not so well adapted for heavy drum crushing.

CONSTRUCTION A FIL TAMPON DE 6x19

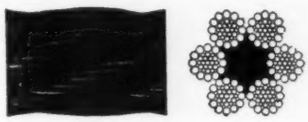
EMPLOIS: Pour câbles de forage rotatif, en diamètres de ⅞ de pouce et de 1 pouce. En général en acier de charrue bien que commandé parfois en qualité d'acier de charrue amélioré. Employé à l'occasion pour câbles de tubage et de tiges aspiratrices, à commettage gauche, centre de chanvre, acier de charrue ou acier de charrue amélioré.

Structure de 6 torons de 19 fils principaux chaque, avec centre en chanvre. Toujours à commettage droit standard. Recommandé pour le plus léger service rotatif car il est plus souple et convient surtout aux grandes vitesses et aux charges légères, mais pas tant au fort écrasement de tambour.

CONSTRUCCION DE ALAMBRE FLEXIBLE DE 6x19

EMPLEOS: Para cables de perforación rotativa, en diámetros de ⅞ a 1". Ordinariamente se hace de acero de arado, pero se suministra también, a veces, de acero de arado perfeccionado, cuando así lo pide el interesado. Se utiliza, de vez en cuando, para varillas de aspiración y tubería. De torcido a la izquierda, alma de cáñamo y acero de arado o de acero de arado perfeccionado.

Construcción de 6 torones, con 19 alambres principales por torón, con alma de cáñamo. Invariablemente se hace con torcido a la derecha, como normal. Se recomienda para la perforación rotativa más liviana, pues es más flexible y se adapta muy bien a las altas velocidades y cargas menos pesadas, pero no se adapta bien a las fuertes tensiones de tambor.



6x31 CONSTRUCTION

USES: For Sucker Rod or Tubing Lines, in ½" to 1" diameters. Made in both Plow Steel and Improved Plow Steel grades.

Constructed of 6 strands of 31 wires each, laid around a Hemp center. Invariably made Left Lay for Sucker Rods and usually for Tubing, though Tubing Lines are sometimes ordered Right Lay. Tubing Lines are usually ordered one size larger than Sucker Rod Lines.

CONSTRUCTION DE 6x31

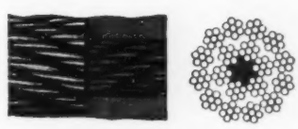
EMPLOIS: Pour câbles de tubage ou de tiges aspiratrices, en diamètres de ½ pouce à 1 pouce. Prévue en acier de charrue et acier de charrue améliorée.

Structure de 6 torons de 31 fils chaque, autour d'un centre de chanvre. Chaque fois à commettage gauche pour tiges aspiratrices et en général pour tubage, bien que pour câbles de tubage on commande parfois commettage droit. Les câbles de tubage sont en général commandés d'une taille plus grande que les câbles de tiges aspiratrices.

CONSTRUCCION DE 6x31

EMPLEOS: Para cables de varillas de aspiración y tubería, en diámetros de ½ a 1". Se hace de acero de arado y de acero de arado perfeccionado.

Construcción de 6 torones, con 31 alambres por torón, alrededor de una alma de cáñamo. Ordinariamente se hace con torcido a la izquierda, para servicio de varillas de aspiración y tubería, pero para servicio se tubería se pide a veces con torcido a la derecha. Los cables para tubería se piden generalmente un tamaño más grande que los cables para varillas de aspiración.



18x7 NON-ROTATING CONSTRUCTION

USES: For Sucker Rod or Tubing Lines, in ½" to 1" diameters. Should be used only on recommendation of rope manufacturer.

Constructed of 12 strands of 7 wires each, laid Right Lay, over an Independent Wire Rope center constructed of 6 strands of 7 wires each laid Left Lay around a Hemp center. Sheaves and drums on which this rope is used should be at least 50% larger in diameter than equipment used for 6x19 and 6x31 Sucker Rod and Tubing Lines. Failure to use such larger equipment will result in early failure of this rope due to "birdcaging."

CONSTRUCTION NON-ROTATIVE 18x7

EMPLOIS: Pour câbles de tubage ou de tiges aspiratrices, en diamètres de ½ pouce à 1 pouce. Ne doit s'employer que sur recommandation du fabricant de câbles.

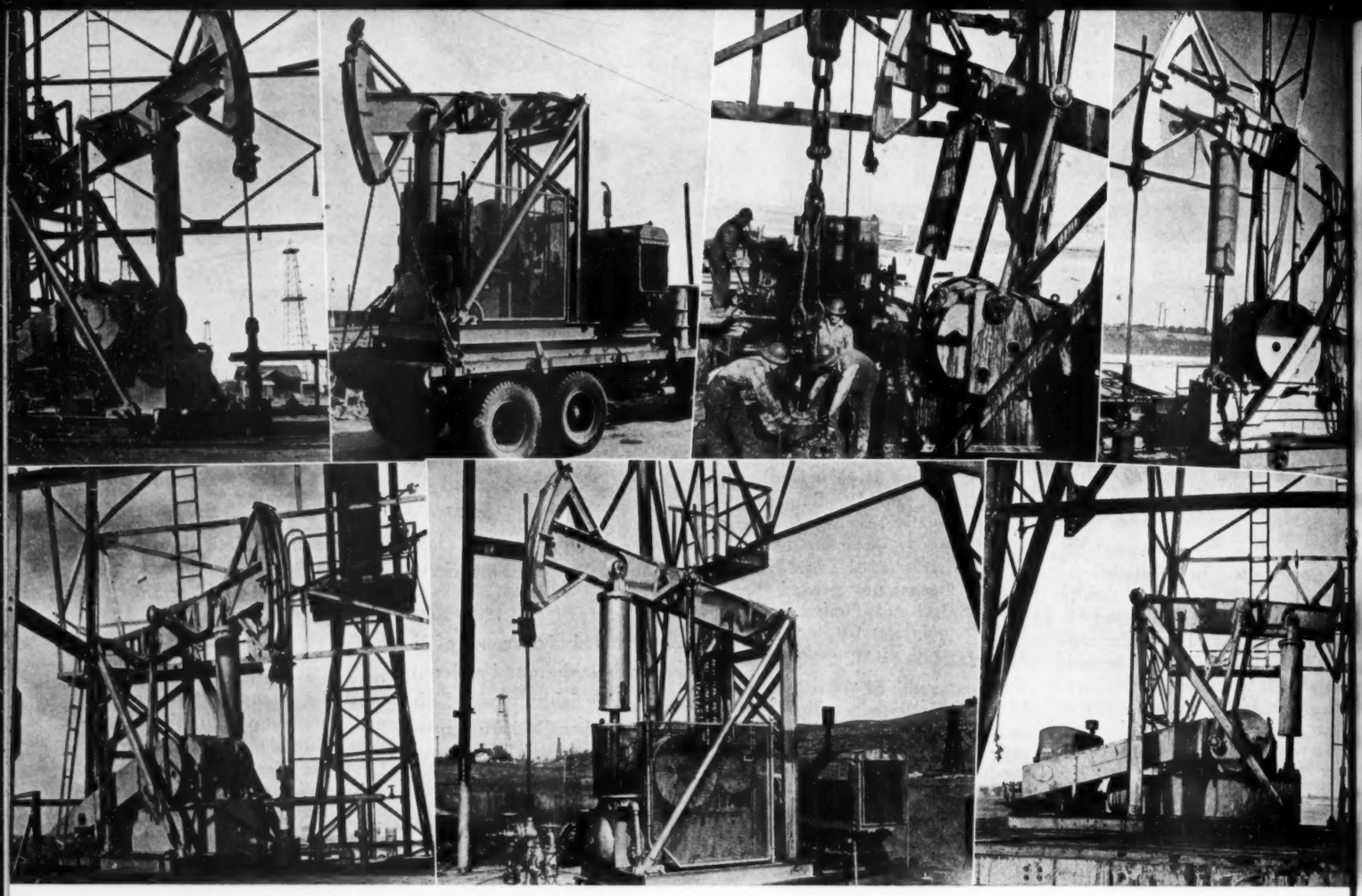
Structure de 12 torons de 7 fils chaque, à commettage droit, autour d'un centre de câble indépendant de 6 torons de 7 fils chaque à commettage gauche autour d'un centre de chanvre. Les poulies et tambours employant ce câble devront avoir au moins 50% de plus de diamètre que le matériel employant les câbles de tubage et de tiges aspiratrices de 6x19 et 6x31. Si on n'emploie pas du fort matériel, le câble ne durera pas par suite de ce qu'on appelle dans la partie "l'encagement d'oiseau."

CONSTRUCCION ANTIGIRATORIA DE 18x7

EMPLEOS: Para cables de varillas de aspiración y tubería, en diámetros de ½ a 1". Debe emplearse sólo cuando lo recomienda el fabricante de cables.

Construcción de 12 torones, con 7 alambres por torón, con torcido a la derecha; el tipo con centro o núcleo independiente de cable de alambre tiene 6 torones, con 7 alambres por torón, cada uno torcido a la izquierda alrededor de una alma de cáñamo. Las poleas y los tambores en que se usa este cable deben ser, por lo menos, 50% más grandes en diámetro, que el equipo empleado para los cables de 6x19 para varillas de aspiración y tubería. Cuando se deja de emplear este equipo más grande, el presente cable queda expuesto a fallar.

Types tant ordinaires que pré-formés (formés par UNION) Tipos ordinarios y preformados (formados por el procedimiento UNION)



LACY *Air Balance* PUMPING UNIT

PROVED BY PERFOMANCE

The cushioning effect of *compressed air* as a counterbalance, employed by the Lacy Air Balance Pumping Unit, offers important advantages in operation and maintenance. Down-time and rod-breakage are minimized. Efficiency of sub-surface equipment is increased. Greater ease and flexibility of handling are made possible; unit can be counterbalanced while running.

Because of its Air Balance, the Lacy Pumping Unit is lighter in weight than other types. Four different size models, ranging in weight from 7,500 to 19,000 pounds, are provided for handling all pumping requirements in wells from the shallowest to those 8,000 feet deep.

The high efficiency, portability and ease of handling made possible by the Lacy Air Balance Pumping Unit have been *proved by performance* . . . in every important producing field in California and the Mid-Continent.

Export Service

The Lacy Air Balance Pumping Unit is carefully crated for export, conforming to the customs regulations of the countries to which shipped.

PROUVÉ EN SERVICE

L'effet amortisseur de *l'air comprimé* pour contrebalancer, tel qu'il est mis en jeu par le groupe de pompage Lacy à équilibrage d'air, a de réels avantages en service et en entretien: Minimum de durée de descente et de ruptures de tiges; meilleur rendement du matériel souterrain; manutention plus aisée et plus souple rendue possible; équilibrage de l'unité possible pendant la marche.

Grâce à son équilibrage d'air, le groupe de pompage Lacy est d'un poids moindre que les autres types. Quatre modèles de tailles différentes, d'une gamme de poids allant de 7.500 à 19.000 lbs., sont prévus pour répondre à tous les besoins de pompage de puits depuis le moins profond jusqu'à des profondeurs de 8.000 pieds.

Le haut degré de rendement, de portabilité et de facilité de manoeuvre offert par le groupe de pompage à équilibrage d'air Lacy a été *prouvé en service* . . . dans tout champ pétrolifere important tant en Californie que dans le Centre.

Service d'exportation

Le groupe de pompage à équilibrage d'air Lacy est soigneusement emballé en caisse à claire-voie pour l'exportation, en observant la règlementation douanière des pays de destination.

DEMOSTRADA FOR SU FUNCIONAMIENTO

El efecto de amortigüación del *aire comprimido*, como contrapeso, empleado en la bomba Lacy de equilibrio neumático, ofrece importantes ventajas en funcionamiento y en conservación mecánica. Se reducen el tiempo de descenso y la rotura de varillas. Se aumenta el rendimiento del equipo subterráneo. Se introduce mayor facilidad y flexibilidad en el manejo; la bomba puede contrapesarse mientras está funcionando.

Debido a su equilibrio neumático, la bomba Lacy es más liviana que la de todo otro tipo. Se ofrecen en modelos de cuatro tamaños diferentes, con pesos comprendidos entre 7.500 y 19.000 libras, para satisfacer todos los requisitos de bombeo, desde los pozos más bajos hasta los de 8.000 pies de profundidad.

El gran rendimiento portabilidad y facilidad de manejo de la bomba Lacy de equilibrio neumático han sido *demostrado por su funcionamiento* en la práctica . . . en todo importante campo petrolífero en California y región central del país.

Servico de Exportación

La bomba Lacy de equilibrio neumático se empaca cuidadosamente en huacales para la exportación, de acuerdo con los reglamentos aduanales de los países de destino.

EXPORT SALES REPRESENTATIVES

R. J. EICHE
NEW YORK LOS ANGELES

GEO. S. FLANDERS
SOUTH AMERICAN REPRESENTATIVE
PORT OF SPAIN, TRINIDAD, B.W.I.

LACY

OIL TOOL CO.
[illegible] NO. MAIN ST. [illegible] CAL.

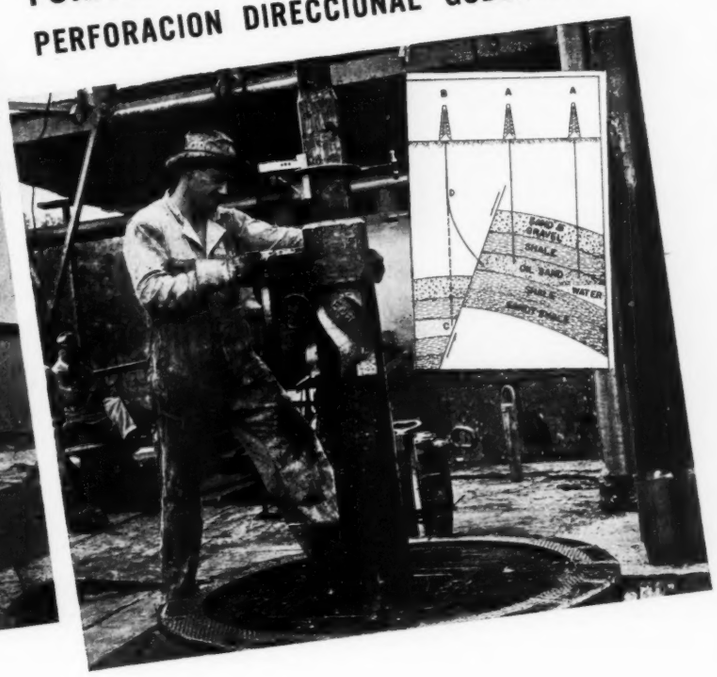
Eastman

SINGLE SHOT SURVEYS

PROSPECTIONS A COUP UNIQUE

EXPLORACIONES DE INDICACION INSTANTANEA

CONTROLLED DIRECTIONAL DRILLING
FORAGE DIRECTIONNEL CONTROLE
PERFORACION DIRECCIONAL GOBERNADA



● The Eastman Single Shot Surveying Instrument makes a permanent photographic record of the angle and direction that the hole is off vertical at the point of survey. Runs in open hole on wire line or drill pipe. Easy to operate. Dependability and accuracy thoroughly proven. Photographic record is easy to read; no special equipment needed for computing angle and direction off vertical. Records may be developed immediately at well location.

This Eastman Instrument also available for running inside drill pipe on wire line, eliminating necessity of coming out of hole to make survey.

The Eastman Multiple Shot Survey Instruments and Photographic Drift Indicators are also offered for sale in foreign fields.

Complete specifications are carried in our catalog No. 38, as well as the 1938 edition of Composite Catalog of Oil Field and Pipe Line Equipment.

● L'instrument de prospection à coup unique Eastman donne un cliché photographique permanent de l'angle et de la direction du puits par rapport à la verticale au point de prospection.

Se descend dans le puits ouvert sur câble ou tuyau de foret. De manoeuvre facile. Régularité et précision entièrement prouvées. Cliché photographique facile à lire; aucun équipement spécial n'est nécessaire pour computer l'angle et la direction par rapport à la verticale. On peut développer les clichés tout de suite et sur place.

Cet instrument Eastman est prévu aussi pour descente à l'intérieur du tuyau de foret sur câble, de sorte qu'il n'est plus nécessaire de sortir du trou pour pouvoir effectuer la prospection.

Il est aussi offert en vente dans les champs étrangers les instruments de prospection multi-coups et indicateurs de dérive photographiques Eastman.

Caractéristiques complètes données dans notre catalogue No. 38, ainsi que dans l'édition 1938 du catalogue combiné du matériel de champs de pétrole et de pipe-lines.

● El instrumento de exploración Eastman de indicación instantánea da un permanente registro fotográfico del ángulo y de la dirección del pozo, en relación a la vertical en el punto de exploración. Se baja por el pozo abierto mediante un cable o tubo de perforación. Se presta a muy fácil manejo. Seguridad y exactitud completamente demostradas. El registro fotográfico es fácil de leer; no hay necesidad de ningún equipo especial para computar el ángulo y la dirección en relación a la vertical. Los registros fotográficos pueden desarrollarse inmediatamente en el mismo sitio.

Este instrumento Eastman se ofrece también preparado para funcionar dentro del tubo de perforación en el cable, de modo que no es necesario sacarlo del agujero para efectuar la exploración.

A la venta, en los mercados extranjeros, ofrecemos también los instrumentos de exploración de indicación múltiple y los indicadores de desviación fotográficos, todos de la famosa marca Eastman.

En nuestro catálogo No. 38 damos las características completas, y también damos esta información en la edición de 1938 del catálogo combinado de material de campos petrolíferos y sistemas de tubería.

● Eastman's unquestioned leadership in the field of Controlled Directional Drilling is due largely to the patented Eastman Removable Whipstock and Drill Pipe Orienting Method. With these tools, Eastman engineers have accomplished every conceivable application of Controlled Directional Drilling from sidetracking junk and hole straightening to fault plane and relief well control. The Removable Whipstock is run in the hole on the first joint of drill pipe, on which the whipstock bit is also installed, and sidetracking operations are begun. No setting tools are needed and no unnecessary and costly trips in and out of the hole are required. The Eastman Drill Pipe Orienting Method lands the whipstock on bottom, facing in any desired direction.

A complete explanation of Controlled Directional Drilling and specifications on all Eastman deflecting tools is shown in our catalog No. 38, as well as the 1938 edition of Composite Catalog of Oil Field and Pipe Line Equipment.

● Le rang incontesté tenu par Eastman dans le domaine du forage directionnel contrôlé est dû surtout au déviateur amovible Eastman breveté et à la méthode d'orientation du tuyau de foret. Avec ces outils, les ingénieurs Eastman ont accompli toute application imaginable de forage directionnel contrôlé depuis l'écartement de ferraille et le redressage de trous jusqu'au contrôle de plan de faute et de puits de soulagement. Le déviateur amovible se descend dans le puits sur le premier joint de tuyau de foret, sur lequel on installe aussi le trépan de déviateur, et on commence alors les opérations de branchement. On n'a pas besoin d'outils de pose et on évite des parcours inutiles et coûteux dans les deux sens. La méthode d'orientation du tuyau de foret préconisée par Eastman dépose le déviateur au fond du trou dans toute direction désirée.

Une explication complète du forage directionnel contrôlé, avec caractéristiques sur tous les outils déviateurs Eastman, est donnée dans notre catalogue No. 38, ainsi que dans l'édition 1938 du catalogue combiné du matériel de champs de pétrole et de pipe-lines.

● La supremacía incuestionable de que goza la Eastman en el campo de la perforación direccional gobernada se debe principalmente el desviador amovible Eastman patentado y al método de orientación del tubo de perforación. Con estas herramientas, los ingenieros de la Eastman han realizado toda clase imaginable de perforación direccional gobernada, desde la perforación desviada para apartarse de algún útil perdido y enderezamiento de agujero, hasta el control o gobierno del plano de desplazamiento y pozo de desahogo. El desviador amovible desciende en el pozo en la primera unión del tubo de perforación, sobre la cual se instala también la barrena del desviador, y de este modo se empieza la operación de desviación. No hay necesidad de herramientas de instalación o colocación y se evitan los viajes costosos e inútiles en ambos sentidos. El método de orientación del tubo de perforación perfeccionado por la Eastman deposita el desviador en el fondo del agujero, enfrentando la dirección que se quiera.

Una explicación completa de la perforación direccional gobernada o dirigida, con las características de todas las herramientas desviadoras Eastman, se da en nuestro catálogo No. 38, y también en la edición de 1938 del catálogo combinado de material de campos petrolíferos y sistemas de tubería.

Eastman OIL WELL SURVEY CORP.

Long Beach Dallas Houston Oklahoma City

Foreign Department: Long Beach, California, U. S. A.

OPERATING SCHEDULES

When first suggested, combination units were considered too big and complicated to permit adequate flexibility and they were sometimes considered impractical for the reason that when any portion of the equipment failed or needed cleaning, the entire unit had to come down.

This thought has been expelled by results of actual operation and even the first combination units do not come down oftener than every 2 to 6 months and then for a relatively short time, depending upon the needs for replacements.

Instead of combination units becoming impracticable for the manufacture of gasoline, they have become exceptionally effective in meeting the demands for high octane motor fuels; their operation has been exceptionally economical and they have been found to be sufficiently flexible to permit the manufacture of many other products. They have also been assembled with low enough capacities to be attractive to the smaller refiner.

INSULATION

It should not be necessary to point out that combination units lend themselves to the very best utilization of heat. Heat is conserved by the efficient exchange of heat within the unit and the dissipation of heat is minimized by the liberal use of insulation of one kind or another.

The large smooth towers and flow lines are easily insulated and the insulation is usually protected from the weather by weather-proofing plastics or paints and a metal coat is often included on the outside.

VALVES

From the discussion which has preceded, it becomes apparent that tight valves and fittings are important parts of a combination unit. It is also apparent that the valves employed in this service must be spread over a very wide range of sizes. Because a large portion of the work is done at high temperature and because relatively high pressures are often involved, only the very best materials and workmanship can be used. In many instances special non-corrosive seats and stems are demanded and it is not uncommon to see high premiums paid for specially designed valves for this service.

In brief, combination units have called for a wide variety of special valves but fewer ordinary valves.

TANKAGE

The compactness and relatively great size of the average combination unit has made a large number of tanks unnecessary. Practically all of the intermediate run-down tanks may be dispensed with.

While the total number of tanks is reduced by the adoption of a combination process, greatly improved tankage is required.

If the combination unit is equipped to recover the lightest fractions of the crude for processing in a separate polymerization unit, it is necessary to have pressure tankage or at least, insulated or floating roof tanks.

This applies primarily to the gasoline fractions as practically the same number of tanks is required for the kerosene, furnace distillate and wax distillate fractions. Fewer fuel oil or heavy oil tanks are needed since the cracking portion of the unit reduces the volume of this fraction recovered from the crude.

ISOLEMENT

Il est à peine nécessaire de faire remarquer que des groupes combinaisons se prêtent à la meilleure utilisation possible de la chaleur. La chaleur est conservée par l'échange bien compris de la chaleur à l'intérieur du groupe, et la dispersion de la chaleur est réduite au minimum par l'emploi libéral d'isolement d'un genre ou d'un autre.

Les grandes tours lisses et les conduites d'écoulement sont faciles à isoler et l'isolement est en général mis à l'abri des intempéries par des plastiques ou peintures à l'épreuve du temps, outre qu'un revêtement métallique est souvent prévu à l'extérieur.

VANNES

Par la discussion qui précède, on a pu se rendre compte que des vannes et des garnitures étanches sont de toute première importance dans un groupe combinaison. Il est clair aussi que les vannes utilisées dans ce service sont fatalement d'une gamme très étendue de calibres. Par suite du fait qu'une forte portion du travail est fait à des hautes températures et qu'on est souvent en présence de fortes pressions, on ne peut faire emploi que du meilleur en matériel et en main-d'oeuvre. Dans de nombreux cas des sièges et tiges de type spécial non-corrosif s'imposent, et il n'est pas rare de voir de fortes primes se payer pour des vannes conçues spécialement pour ce service.

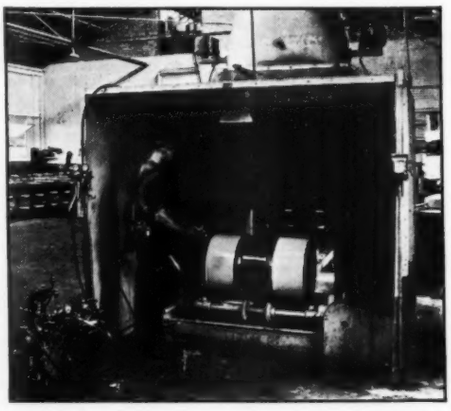
En résumé, les groupes combinaisons ont demandé une grande variété de vannes spéciales, mais moins de vannes de type ordinaire.

RESERVOIRS

La compacité et la grandeur relativement forte du groupe combinaison courant ont permis de se dispenser d'un grand nombre de réservoirs. On peut maintenant se passer d'à peu près tous les réservoirs de recette intermédiaires.

Mais si le nombre total de réservoirs se trouve réduit par l'adoption d'un procédé de combinaison, il faut par contre employer un système de réservoirs très perfectionné. Si le groupe combinaison est équipé pour extraire les fractions les plus légères du pétrole brut pour traitement dans un groupe de polimérisation séparé, il est nécessaire de faire emploi de réservoirs sous pression ou tout au moins de réservoirs isolés ou à toit flottant.

Ceci s'applique surtout aux fractions d'essence car à peu près le même nombre de réservoirs est demandé pour les fractions de pétrole lampant, de distillé de fourneau et de distillé de cire. On n'a pas besoin d'autant de réservoirs de fuel oil ou d'huiles lourdes puisque la partie de cracking du groupe réduit le volume de cette fraction extraite du pétrole brut.



Painting oil drums is almost an automatic procedure in a modern compounding plant

La peinture des tambours de petrole est une operation presque automatique dans un atelier de compoundage moderne

El pintar tambores de petroleo es un procedimiento casi completamente automatico en un moderno establecimiento mezclador

PROGRAMAS DE OPERACION

Cuando se habló de ellas, por primera vez, las instalaciones de combinación se consideraron demasiado grandes y complicadas para permitir una adecuada flexibilidad, y a veces se consideraron también imprácticas, dándose por razón que al fallar alguna parte del equipo o al necesitar limpieza, tenía que pararse toda la instalación.

Esta idea ha desaparecido en vista de los resultados de la actual operación y aun las primeras instalaciones de combinación no se paran más de una vez por cada 2 a 6 meses, y al pararse, quedan inoperativas sólo por un corto tiempo, que depende de las reparaciones que se les haga.

En lugar de ser imprácticas para la manufactura de gasolina, las instalaciones de combinación resultan en sumo grado efectivas en satisfacer la demanda de combustibles de motor con alto número de octano. Su operación ha sido extraordinariamente económica y se ha visto que son suficientemente flexibles o adaptables a la manufactura de muchos otros productos. Se han establecido algunas con capacidades bastante bajas para hacerlas convenientes a los refinadores más pequeños.

AISLAMIENTO

No debería ser necesario indicar aquí que las instalaciones de combinación se prestan a la mejor utilización posible del calor. El calor se conserva por el eficaz intercambio de calor dentro de la instalación y la disipación del calor se minimiza por el amplio empleo de aislamiento de todo género.

Las grandes y tersas torres y las tuberías se aislan con facilidad y el mismo aislamiento se portege generalmente contra la intemperie con plásticos o pinturas impermeables, aplicándose a menudo una capa metálica al exterior.

VALVULAS

Por lo que hemos dicho hasta esta momento, se comprenderá que las válvulas y conexiones son piezas muy importantes de la instalación de combinación. Las válvules empleadas en este tipo de servicio quedan comprendidas dentro de una gran escala de tamaños. A causa de que una gran parte del trabajo se hace bajo altas temperaturas y en vista de las grandes presiones que se presentan, sólo pueden emplearse válvulas de gran precisión hechas de los mejores materiales. En muchos casos, se exigen asientos y vástagos de metales especiales no corrosivos, y no se raro ver que se paguen muy altos precios por válvulas exclusivamente proyectadas para este servicio.

En resúmen, las instalaciones de combinación necesitan una gran variedad de válvulas especiales y sólo un número limitado de válvulas ordinarias.

DEPOSITOS O TANQUES

Debido al tamaño relativemente grande y unificación de las instalaciones de combinación, en general, no hay necesidad de emplear un gran número de tanques o depósitos. Casi todos los receptáculos intermediarios se han eliminado de estas instalaciones.

Si por una parte se ha reducido el total de tanques, gracias a la adopción de un procedimiento de combinación, por la otra se requieren tanques o depósitos de construcción notablemente perfeccionada. Cuando la instalación está equipada para recuperar las fracciones más volátiles del petróleo crudo, para su tratamiento en una instalación separada de polimerización, se presenta entonces la necesidad de tanques de presión o por lo menos, de tanques con techos aislados o flotantes.

Esto se aplica principalmente a las fracciones de gasolina, pues casi el mismo número de depósitos o tanques se requiere para la kerosina, destilado de horno y fracciones destiladas de parafina o cera. Se necesitan menos tanques para aceite combustible y aceite pasado, debido a que la parte de "cracking" de la instalación reduce la cantidad de estos productos recuperados del petróleo crudo.

STAR PORTABLE DRILLING MACHINES

Star machines are used for drilling oil, gas and water wells—blast hole drilling and mineral prospecting

Full portability and high efficiency have made the name "Star" synonymous with drilling economy the world over. Star machines move completely assembled, greatly reducing rig-up time, and use a portable mast which eliminates the need of erecting a derrick. They may also be used under a standard derrick.

Star machines for drilling new wells are built in a number of sizes and various models and capacities—the smallest for wells up to 300 feet and the largest for wells up to 4500 feet. Machines for shallow drilling are available in pneumatic tire or steel wheel trailer models, also for mounting on trucks. The larger size machines for deep drilling are built in super tractor models, traveling under their own power, and in trailer models which use a separate power unit.

Several models of Star machines are especially designed for cleaning out oil and gas wells—the smallest machine for this work having a capacity up to 600 feet and the largest up to 6000 feet.

Complete details on the correct model Star and our recommendations will be sent if you will give us the following information: (1) Is machine wanted for new drilling or cleaning-out? (2) Depth of well. (3) Diameter of holes. (4) Nature of formations.

MACHINES DE FORAGE PORTATIVES STAR

Les machines Star s'emploient pour le forage des puits à pétrole, à gaz et à eau—en forage par explosion et en prospection minérale.

La portabilité parfaite et le haut rendement ont signalé dans le monde entier la marque "Star" comme synonyme d'économie en forage. Les machines Star se transportent complètement montées, d'où forte réduction de la mise en train, et emploient un mât portatif qui supprime la nécessité de dresser une tour de sondage. Elles peuvent aussi s'employer sous une tour de sondage standard.

Les machines Star pour le forage de nouveaux puits sont prévues pour toute une gamme de calibres et divers modèles et capacités—les plus petites pour puits allant jusqu'à 300 pieds et les plus grandes pour puits allant jusqu'à 4500 pieds. Les machines pour forage peu profond sont offertes en modèles sur remorque à roues pneumatiques ou en acier, aussi pour monter sur camions. Les grandes machines prévues pour forage profond sont construites en modèles super-tracteurs, se déplaçant par leur propre force motrice, et aussi en modèles sur remorque qui emploient un groupe tracteur séparé.

Plusieurs modèles de machines Star sont étudiés spécialement pour nettoyer les puits à pétrole et à gaz—la plus petite machine pour ce travail ayant une capacité allant jusqu'à 600 pieds et la plus grande jusqu'à 6000 pieds.

Des détails complets sur le modèle Star approprié, ainsi que nos recommandations, vous seront envoyés si vous voulez bien nous donner les précisions suivantes: (1) La machine est-elle désirée pour nouveau forage ou nettoyage? (2) Profondeur du puits. (3) Diamètre des trous forés. (4) Nature des formations.

MAQUINAS PERFORADORAS PORTATILES STAR

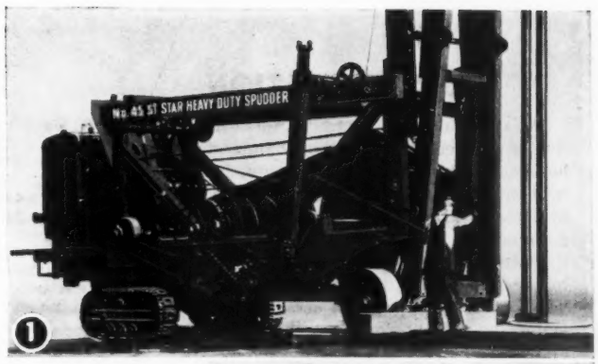
Las máquinas perforadoras Star se emplean para la perforación de pozos de petróleo, de gas y de agua, y también para la perforación de agujeros de explosión y exploraciones mineras.

La portabilidad perfecta y el alto rendimiento han hecho que el nombre "Star" sea sinónimo de economía en perforación, en todo el mundo. Las máquinas Star se transportan completamente montadas, lo que reduce grandemente el tiempo de preparación, y emplean un mastil portátil, que suprime la necesidad de construir una torre. Pueden también emplearse debajo de una torre de perforación de tipo corriente.

Las máquinas Star para la perforación de pozos nuevos se ofrecen en una amplia escala de tamaños, modelos y capacidades—desde las más pequeñas, para pozos hasta de 300 pies, hasta las más grandes, para pozos hasta de 4.500 piés. Las máquinas para perforación a poca profundidad se ofrecen en remolques con ruedas de acero o con ruedas provistas de neumáticos. También se ofrecen para instalación en camiones. Las máquinas más grandes, para perforación a mucha profundidad, se ofrecen en modelos montados en tractores, que viajan bajo su propia fuerza, o en modelos montados sobre remolques, que se valen de un grupo motor separado.

Varios modelos de máquinas Star han sido proyectados especialmente para la limpieza de pozos de petróleo y de gas. La máquina más pequeña para esta clase de trabajo tiene una capacidad máxima de 600 pies, y la más grande, una capacidad máxima de 6.000 piés.

Suministraremos información detallada sobre el correcto modelo Star, incluyendo nuestras recomendaciones, cuando se nos de la información siguiente: (1) Se necesita la máquina para la perforación de un pozo nuevo o para la limpieza de uno antiguo? (2) Profundidad del pozo. (3) Diámetros de los agujeros. (4) Caracter de la formación o yacimiento.



1. No. 45 super tractor spudder, 2500-3500 feet drilling capacity.

1. Béquille super-tracteur No. 45, capacité de forage de 2500-3500 pieds.

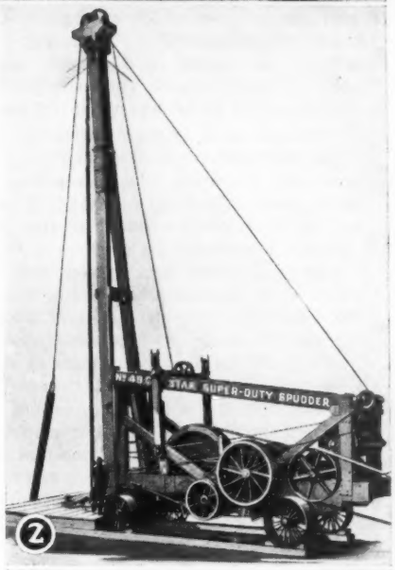
1. Equipo No. 45 sobre tractor, con capacidad de perforación de 2.500 a 3.500 piés.

★

2. No. 49C trailer model spudder, 3500-4500 feet drilling capacity.

2. Béquille sur remorque No. 49C, capacité de forage de 3500-4500 pieds.

2. Equipo No. 49 C sobre remolque, con capacidad de perforación de 3.500 a 4.500 piés.



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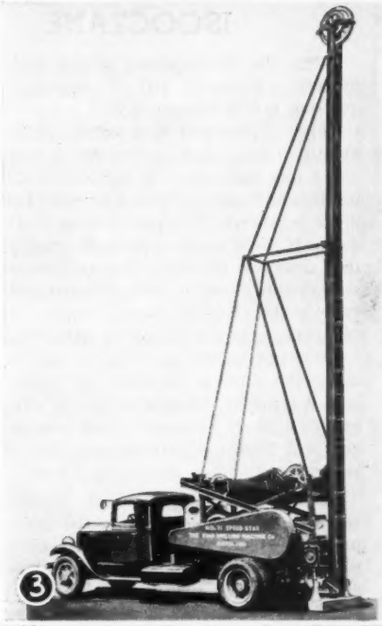
3. No. 71, all steel construction, drilling capacity 600 ft.

3. No. 71, tout en acier, capacité de forage de 600 pieds.

3. Equipo No. 71, enteramente de acero, con capacidad de perforación hasta de 600 piés.



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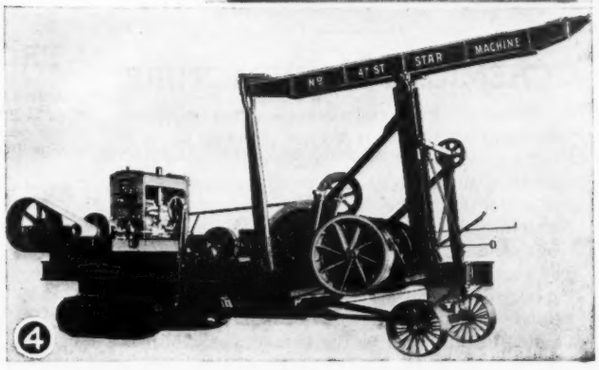
4. No. 47 super tractor, for cleaning out, capacity 3000-4500 feet.

4. No. 47 super-tracteur, pour nettoyage, capacité de 3000-4500 pieds.

4. Equipo No. 47 sobre tractor, para limpieza, con capacidad de 3.000 a 4.500 piés.



THE STAR DRILLING MACHINE COMPANY

AKRON, OHIO, U. S. A. • **Branches:** CHANUTE KANSAS PORTLAND OREGON ABILENE TEXAS

Cable Address "Stardrill" Akron

POLYMERIZATION

In a combination operation, straightrun gasoline of any desired distillation characteristics may be recovered from the crude directly, and the heavier fractions may be reformed or cracked to produce more gasoline. The reformed and cracked gasolines are inherently better motor fuels from the standpoint of their higher antiknock value, but in the past year still higher octane values have been demanded for special uses. To produce such motor fuels, technologists developed the process known as polymerization. They chose as a raw material the gases which were made during the cracking operation and, in the interest of conservation, they devised ways and means to convert these gases to liquid products. The latter were designed to be especially valuable as motor fuel constituents.

Two general types of polymerization plants are in use, the catalytic and thermal. Much has been previously published on each of these processes but it should be pointed out that 1937 marked the year in which polymerization received general attention commercially. Its possibilities for utilizing the gases available seem without limit and estimates of the possible production of motor fuel in the United States by polymerization alone has been estimated in excess of 9,000,000,000 gallons annually. The quality of the gasoline made by the process varies according to the nature of the charging stock and the intensity of temperatures and pressures used and the nature of the catalyst, if used. It is sufficient to point out that polymerized gasoline is a superior motor fuel constituent and is commercially available with octane values usually between 80 and 90.

ISOOCTANE

With the development of the polymerization process to make a series of gasolines of varying qualities it was natural to pick out the one giving the highest possible octane value and that has been identified as a single hydrocarbon, given the popular name "isooctane." It has a very definite composition and therefore has a constant boiling point. Since this is true it is not suitable as a motor fuel alone. It must be blended with other polymerization fractions or with natural gasoline or even straightrun gasoline of high antiknock value to provide the proper volatility for the blend. Since the blending of any one of the latter with isooctane reduces the octane value below that of isooctane alone, the value is built back by using tetraethyl lead. A typical 100-octane motor fuel of commercial composition may contain 50 per cent isooctane, 35 per cent 70-octane aviation gasoline, 15 per cent isopentane and 3 cc. of tetraethyl lead.

The inclusion of the word "isopentane" here simply indicates the use of another polymerization product which is being commercially manufactured and is available for such use. It has a lower antiknock value than isooctane. The isopentane can probably be made more cheaply also.

CHEMICAL MANUFACTURE

Since cracking and polymerization represent the two tools by which refiners may tear down or build up hydrocarbon molecules almost at will, it is only natural that in addition to the manufacture of motor fuels, they turn their attention to the manufacture of hydrocarbons outside of the motor fuel range.

This field is attractive because of the large supply of oil and gas available and prices of the finished products are relatively high. But they are halted in this work by the lack of adequate mar-

(Continued on Page 257)

POLIMERISATION

Dans une opération de combinaison, on peut extraire directement du pétrole brut de l'essence de distillation de toutes caractéristiques de distillation désirées, et on peut réformer ou cracker les fractions les plus lourdes pour produire davantage d'essence. Les essences réformées et crackées sont de part leur nature même de meilleurs carburants moteurs au point de vue de leur grande valeur antidétonante, mais au cours de l'an dernier on a demandé des valeurs en octane encore plus fortes pour des usages spéciaux. Aux fins de produire ce type de carburants moteurs, les technologistes ont mis au point le procédé connu sous le nom de polimérisation. Ils ont choisi comme matière première les gaz qui étaient faits pendant l'operation du cracking et, aux fins de conservation, ils ont mis au point des procédés pour convertir ces gaz en produits liquides. Ces derniers étaient appelés à devenir des éléments de haute valeur dans la composition des carburants moteurs.

Deux types généraux d'installations de polimérisation sont en usage, le type catalytique et le type thermique. On a déjà beaucoup écrit dans le passé sur chacun de ces procédés, mais il est bon de signaler que 1937 a marqué l'année où la polimérisation a reçu commercialement une attention générale. Ses possibilités pour utiliser les gaz disponibles semblent sans limite et on a estimé aux Etats-Unis à plus de 9.000.000.000 de gallons par an la production possible de carburant moteur par la seule méthode de polimérisation. La qualité de l'essence obtenue par ce procédé varie avec la nature de la matière de chargement, avec l'intensité des températures et des pressions mises en jeu, et enfin avec la nature du catalyseur quand on en emploie un. Qu'il suffise de signaler que l'essence polimérisée est un élément supérieur dans la composition des carburants moteurs et se trouve dans le commerce avec des indices d'octane en général compris entre 80 et 90.

ISOOCTANE

Dans l'élaboration du procédé de polimérisation aux fins de préparer une série d'essences de qualités variables, il n'était que naturel qu'on retienne celle apte à donner l'indice octane le plus fort possible, et c'est ainsi qu'on a identifié un carbure d'hydrogène bien défini qui a reçu le nom populaire d'isooctane. Il a une composition bien établie et a par suite un point d'ebullition constant. Etant donné que ceci est vrai, il n'est pas approprié pour s'employer seul comme carburant moteur. Il faut le mélanger avec d'autres fractions de polimérisation ou encore avec de l'essence naturelle ou même de l'essence de distillation de haute valeur antidétonante aux fins d'assurer au mélange la volatilité qui convient. Etant donné que le mélange de l'une quelconque de ces dernières avec de l'isooctane réduit la valeur en octane à un point en-dessous de l'isooctane seul, on reconstitute cette valeur par l'emploi de plomb tétraéthylique. Un carburant moteur d'indice octane 100 typique de composition commerciale peut contenir 50 pour cent d'isooctane, 35 pour cent d'essence d'aviation d'indice octane 70, 15 pour cent d'isopentane et 3 cc. de plomb tétraéthylique.

L'inclusion du mot "isopentane" ici indique simplement l'emploi d'un autre produit de polimérisation qui se fabrique sur une base commerciale et peut s'obtenir pour cet emploi. Il a une valeur antidétonante moindre que celle de l'isooctane. El outre, l'isopentane est probablement d'un prix de revient moindre.

PRODUCTION CHIMIQUE

Puisque le cracking et la polimérisation représentent les deux outils au moyen desquels les raffineurs peuvent presque à volonté désintégrer ou édifier les molécules de carbures d'hydrogène, il n'est que naturel que, en dehors de la fabrication des carburants moteurs, ils tournent leur attention sur la production de carbures d'hydrogène non compris dans la série des carburants moteurs.

Ce domaine est particulièrement attirant par suite des grandes quantités de pétroles et de gaz disponibles et aussi des prix relativement élevés qu'on peut tirer des produits finis. Toutefois, les progrès dans cette voie sont ralentis du fait du manque de débouchés suffisants à ces produits. Il es résulte qu'un volume relativement faible de

(Continué sur Page 257)

POLIMERIZACION

En un procedimiento de combinación, se puede recuperar gasolina de esencia de destilación de cualquiera característica de destilación, directamente del petróleo crudo, y las fracciones menos volátiles pueden reformarse o separarse bajo presión para producir más gasolina. Las gasolinas reformadas o de esencia de cracking son inherentemente mejores combustibles de motor, desde el punto de vista de su mayor valor antidetonante, pero el año pasado, ha habido demanda de mayores valores en octanos, para usos especiales. Para producir semejantes combustibles, los tecnologistas desarrollaron el procedimiento que se llama polimerización. Como materia prima, se emplea en este procedimiento el gas que se produce en la operación de cracking y por medida de conservación, se idearon medios para convertir este gas en líquido. Estos productos líquidos resultan muy valiosos como constituyentes de combustibles para motores.

Hay en uso dos tipos de instalaciones de polimerización: la de catálisis y la termal. Mucho se ha escrito ya sobre cada uno de estos procedimientos, pero es bueno añadir que 1937 fué el año en que la polimerización recibió general atención, desde el punto de vista comercial. Sus posibilidades para la utilización de los gases disponibles parecen no tener límite y se ha calculado que la producción posible de combustibles para motores, en los Estados Unidos, mediante el procedimiento de polimerización únicamente, podría llegar a más de 9.000.000.000 de galones al año. La calidad de la gasolina producida por este procedimiento varía de acuerdo con el caracter del material de carga y la intensidad de las temperaturas y presiones, que se emplean, y por supuesto, de acuerdo con el catalizador empleado, cuando se sigue este procedimiento. Suficiente es que sepamos que la gasolina polimerizada es un excelente constituyente de combustible de motor y que se ofrece ahora en el mercado, con valores corrientes entre 80 y 90 octanos.

ISOOCTANO

Con el desarrollo del procedimiento de polimerización para producir una serie de gasolinas de distintas propiedades, fué natural que se eligiera identificada como un sencillo hidrocarburo, que ha recibido el popular nombre de "isooctano." Como tiene una composición muy definida, ofrece un punto de ebullición constante. Por esta misma razón, no resulta adecuado como combustible de motor, al emplearse solo. Tiene que mezclarse con otras fracciones polimerizadas, o con gasolina natural y aun con gasolina de esencia de destilación de alto valor antidetonante, para que pueda ofrecer en su mezcla debida volatilidad. Como la mezcla de cualquiera de estas gasolinas con isooctano reduce el valor de octano a menos que el del isooctano solo, hay entonces que restablecer este valor con la adición de tetraetilio de plomo. Un típico combustible de motor de 100 octanos de composición comercial puede contener 50 por ciento de isooctane, 35 por ciento de gasolina de aviación de 70 octanos, 15 por ciento de isopentano y 3 c.c. de tetraetilio de plomo.

La inclusión de la palabra "isopentano" indica sencillamente el empleo de otro producto de la polimerización, que se hace ahora sobre base comercial, para los fines de mezclas. Tiene un menor valor antidetonante que el isooctano. El isopentano probablemente puede producirse también de un modo más económico.

MANUFACTURA QUIMICA

Como los procedimientos de cracking y polimerización representan las dos herramientas de que los refinadores se valen para separar y reunir las partículas de hidrocarburo, casi a voluntad, es muy natural que, además de la manufactura de combustibles de motores, se haya dado atención a la manufactura de hidrocarburos para otros fines que no sean los de combustible de motor.

Este campo es atractivo, a causa del gran abastecimiento de petróleo y gas disponsible y los precios relativamente subidos de los productos acabados. Se presenta, sin embargo, una limitación en ste trabajo, debido a la falta de adecuados mercados para estos productos. Como resultado de ésto, una cantidad comparativamente pequeña de semejantes productos es convertida anualmente, y la mayor parte de este trabajo lo hacen algunas

(Continué en Página 257)

An Eighteen Months Achievement in Design and Construction Covering Many Countries

The above figures on new Distillation and Treating Plant capacity completed during the past eighteen months or now under construction by Badger Engineers is indicative of the call for Badger service.

That much of this production is in countries other than the United States is indicative of the far-flung scope of this service and of the careful organization of work and purchase of materials.

E. B. BADGER & SONS CO.

BOSTON NEW YORK SAN FRANCISCO

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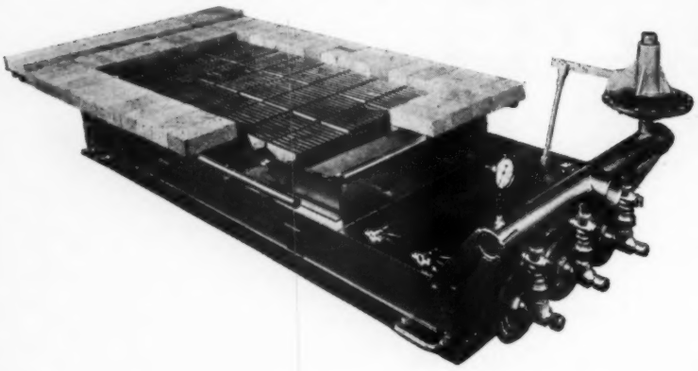
Engineers and Contractors
for Petroleum Distillation and Refinery Equipment

The New SONNER

Oil Field GAS SAVING BURNER

Le nouveau BRULEUR ECONOMISEUR DE GAZ pour champs pétroliers SONNER

El nuevo QUEMADOR ECONOMIZADOR DE GAS SONNER para campos petrolíferos



THAT:—is a single compact unit; slides under the boiler; can be installed in thirty minutes; requires only from two to five pounds gas pressure; can be adjusted for better combustion while the boiler is being fired at full load; once adjusted requires no further attention; will develop the highest possible overloads with absolutely no damage to the boiler because the heat is applied to the crown sheet and flues instead of the sidewalls and mudring, thereby eliminating a lot of boiler trouble, as well as giving higher efficiency.

SEE COMPOSITE CATALOG OIL FIELD EQUIPMENT.

QUI:—est un groupe compact unitaire; se glisse sous la chaudière; peut s'installer en 30 minutes; ne demande que de 2 à 5 lbs. de pression de gaz; peut se régler pour une meilleure combustion pendant que la chaudière est sous pleine pression; une fois réglé ne demande plus de surveillance; développera les surcharges les plus fortes possibles sans aucun danger pour la chaudière car la chaleur est appliquée à la tôle couronne et conduites au lieu d'aux murs latéraux et bague de boue, ce qui met fin à bien des ennuis de chaudière, tout en donnant un plus haut rendement.

VOIR MATERIEL DE CHAMPS PETROLIERS DANS CATALOGUE COMBINAISON

ESTE—es un grupo unitario compacto; se desliza debajo de la caldera; se puede instalar en 30 minutos; no exige más de 2 a 5 libras de presión de gas; puede regularse para una mejor combustión mientras la caldera está bajo presión máxima; una vez regulado, no requiere más atención; desarrollará las sobrecargas más grandes posibles sin ningún peligro para la caldera, pues el calor queda aplicado a la lámina superior y conductos, en lugar de las paredes laterales y cámara del lodo, evitándose así muchas irregularidades e inconvenientes de caldera y asegurándose, al mismo tiempo, un rendimiento más alto.

VEA NUESTRA SECCION EN EL CATALOGO DE COMBINACION

Export Distributors: THE OIL WELL SUPPLY COMPANY.

Distributeurs d'exportation: THE OIL WELL SUPPLY COMPANY

Distribuidores para la exportación: THE OIL WELL SUPPLY COMPANY

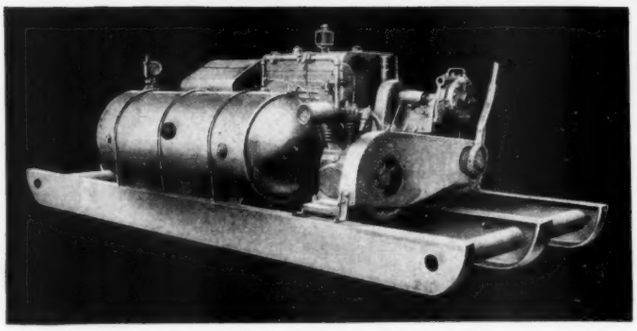
The SONNER BURNER COMPANY

WINFIELD, KANSAS, U. S. A.

NOVO

SALES AND SERVICE BY

National SUPPLY



NOVO ROTARY DRILLING AUXILIARY OUTFIT

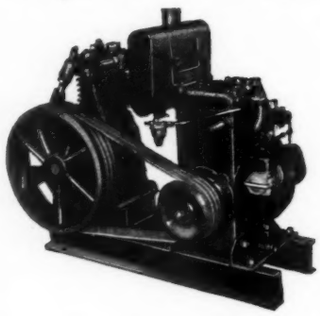
A compact outfit composed of generator and pump. A compressor for diesel engine starting may be added. All are driven by a heavy duty 4 cyl. gas or gasoline engine.

NECESSAIRE AUXILIAIRE DE FORAGE ROTATIF NOVO

Un groupe compact composé de générateur et de pompe. On peut y ajouter un compresseur pour démarrage de moteur Diesel. Ils sont tous entraînés par un moteur à gaz ou à essence 4 cyl. de service dur.

EQUIPO AUXILIAR DE PERFORACION ROTATIVA NOVO

Un equipo compracto, que comprende generador y bomba. Se puede agregar un compresor para el arranque del motor diésel. Emplea un motor de gas o de gasolina de cuatro cilindros de trabajo pesado.



COMPRESSOR UNITS

For oil or gas engine starting. A complete line that operate on either gas or gasoline. Sturdy, compact units. V-belt driven by Novo heavy duty industrial engines.

GROUPES COMPRESSEURS

Pour démarrage de moteur à pétrole ou à gaz. Une série complète qui emploie soit le gaz, soit l'essence. Groupes robustes et compacts. Actionnés par moteurs industriels de service dur Novo et courroies en V.

COMPRESORES COMPLETOS

Para el arranque de motores de petróleo o de gas. Un surtido completo, que funciona con gas o gasolina. Compactos, firmes y durables. Accionados por motores industriales de trabajo pesado Novo y correas en V.

NOVO LIGHT PLANTS

Are especially designed for oil fields with over-size engine, over-size fuel tank, house over all, best heavy duty generator. Operation on gas or gasoline.

GROUPES ELECTROGENES NOVO

Ils sont spécialement étudiés pour les champs de pétrole avec moteur et réservoir à carburant amplement calculés, carter sur tout, générateur de service dur de classe. Emploi du gaz ou de l'essence.

PLANTAS DE ALUMBRADO NOVO

Han sido especialmente proyectadas para campos petrolíferos. Tienen motor y depósito de combustible de amplia capacidad, tapa protectora sobre todo y un generador excelente de trabajo pesado. Funciona con gas o gasolina.

NOVO	NOVO	NOVO
Pumps	Pompes	Bombas
Engines	Moteurs	Motores
Generators	Dynamos	Dinamos
Compressors	Compresseurs	Compresores

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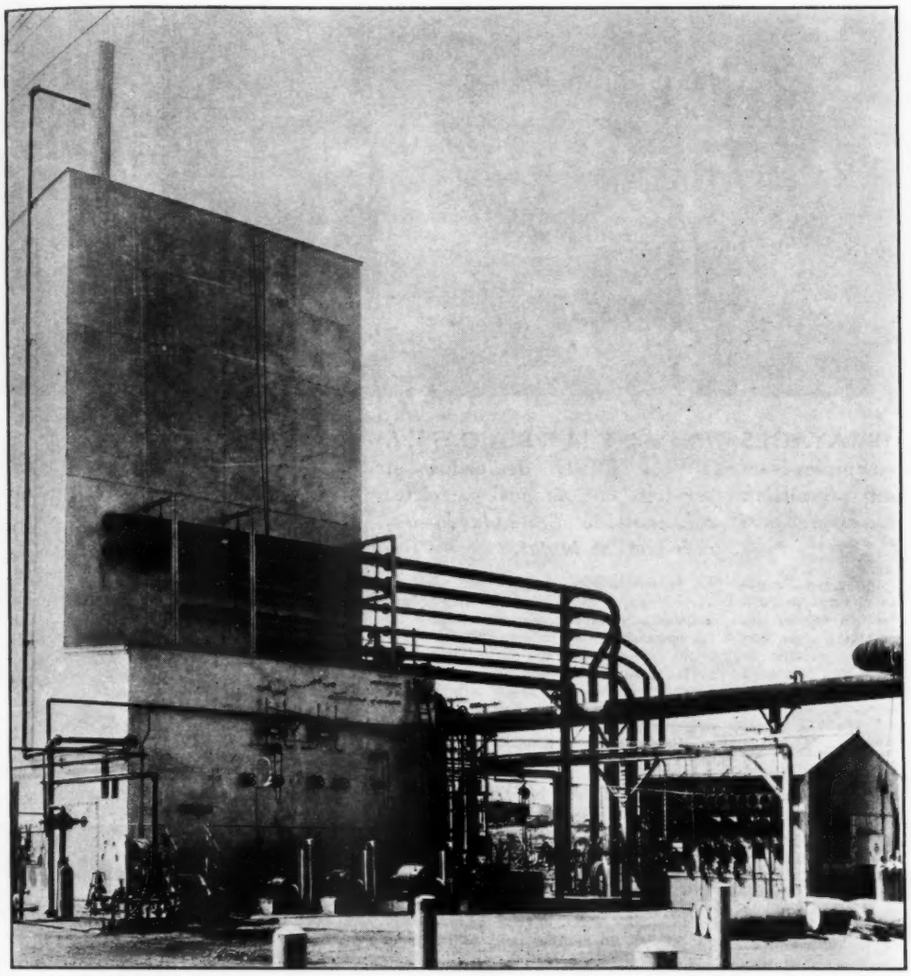
NATIONAL SUPPLY COMPANY, EXCLUSIVE DOMESTIC OIL FIELD DISTRIBUTORS



Gas purification unit in the El Segundo, Calif., refinery of the Standard Oil Co. of California. It removes 95 per cent of the hydrogen sulfide from 22,000,000 cubic feet of refinery gas daily

Groupe de purification des gaz dans la raffinerie de El Segundo, Calif., de la Standard Oil Co. of California. Il extrait par jour 95 pour cent d'hydrogene sulfure de 22.000.000 pieds cubes de gaz de raffinerie

Instalacion de purificacion de gas en El Segundo, refineria en California de la Standard Oil Co. of California. Extrae como el 95% del sulfuro de hidrogeno de 22.000.000 de pies cubicos de gas de refineria al dia

kets for these products. As a result, comparatively little volume of such products are converted and most of this is done by established chemical companies who buy the refinery gases, process them through their plants to make various alcohols, glycols, ketones, aldehydes, etc. It is possible to produce large quantities of such specific products as toluene, ethylene, benzol and their derivatives but the present sources of supply appear adequate.

CHEMICAL TREATING

While the refining industry is in a position to manufacture certain chemicals, it is also a major customer of the chemical industry. About $100,000,000 is spent annually for the chemicals used in refineries.

In the past year many new problems have arisen in connection with treating the various polymerization gasolines and there has also been definite progress made in conserving the octane values of cracked gasolines, particularly through the use of newly developed treating methods and inhibitors.

Gum formation in this class of motor fuels still proves to be a handicap and it is for this reason, to-

(Continued on Page 264)

ces produits est converti ainsi, et la majorité de ce travail est fait par des sociétés chimiques établies qui achètent les gaz de raffineries, les traitent dans leurs propres installations pour préparer divers alcools, glycols, cétones, aldéhydes, etc. Il est possible de produire de fortes quantités de produits définis comme le toluène, l'éthylène, le benzol et leurs dérivés, mais les sources d'approvisionnement actuelles semblent suffisantes.

TRAITEMENT CHIMIQUE

Bien que l'industrie de la raffinerie soit à même de fabriquer certains produits chimiques, elle est aussi un important client de l'industrie chimique. Il est dépensé annuellement $100.000.000 environ en produits chimiques utilisés dans les raffineries.

Au cours de l'an dernier, de nombreux problèmes nouveaux se sont présentés au sujet du traitement des diverses essences de polimérisation, et on a fait aussi des progrès marqués pour conserver les valuers en octane des essences crackées, en particulier par l'emploi de méthodes de traitement et d'inhibiteurs de mise au point récente.

La formation de gomme continue à être un handicap dans cette classe de carburants moteurs, et c'est pour cette raison, ainsi qu'aux fins de réduire les prix de revient, qu'on a étudié des modifications du traitement classique au plombite ou à l'acide et au plombite.

L'emploi du chlorure de cuivre comme réactif de traitement a gagné du terrain au cours de l'an

(Continué sur Page 264)

compañías de productos químicos, desde hace tiempo establecidas, las cuales compran de las refinerías los gases necesarios, tratándolos en sus propios establecimientos. De este modo producen varias clases de alcohol, glicol, ketona, aldehido, etc. Es también posible producir grandes cantidades de tolueno, etileno, benzol y otros derivativos específicos, pero parece que son adecuadas las presentes fuentes de abastecimiento de todos estos productos.

TRATAMIENTO QUIMICO

A pesar de que la industria de la refinería de petróleo está preparada para manufacturar ciertos productos químicos, es, al mismo tiempo, importante cliente de la industria química. Las refinerías consumen anualmente en sus trabajos como 100.000.000 de dólares en substancias químicas.

Durante el año pasado se presentaron muchos nuevos problemas en conexión con el tratamiento de las varias gasolinas polimerizadas y se ha alcanzado un progreso considerable en la conservación de los valores de octano de las gasolinas producidas por cracking, particularmente mediante el empleo de perfeccionados métodos de tratamiento y mejores inhibitores.

La formación de gomosidad en sta clase de combustibles de motor todavía constituye un obstáculo, y es por esta razón,conjuntamente con la tendencia a reducir los costos, que se han efectuado revisiones en el corriente método de tratamiento a plombita, lo mismo que en el de ácido y plombita.

El empleo de cloruro de cobre, como reactivo avanzó mucho el año pasado, particularmente en la recuperación de vapor y gasolina natural.

Se ha recurrido a una utilización más vasta del tratamiento con ácido sulfúrico, en el cual el contacto entre el ácido y el petróleo es de muy corta duración, seguida por completa separación mediante acción centrífuga.

Los procedimientos de tratamiento, en la manufactura de gasolina, han sido esencialmente proyectados, en estos más recientes meses, con el fin de conservar los valores de octano y reducir los costos de la operación química.

HIDROGENACION

En los Estados Unidos, la hidrogenación de los pesados petróleos de residuo, para la manufactura de ordinarios combustibles de motor y lubricantes, se ha visto que es incapaz de competir, sobre una base de costo, con la manufactura de estos productos por el procedimiento de cracking; pero, en varios países del extranjero, la hidrogenación de los alquitranes de hulla ha llegado a grandes proporciones en conexión con la produción de combustibles de motor.

La hidrogenación, en este país, se ha empleado para producir combustibles para motores diésel. Gracias a ella, ha sido posible mejorar la parafinicidad del petróleo destilado para diésel, lo cual, a su turno, ha mejorado sus propiedades antidetonantes.

La hidrogenación ha sido también útil en aumentar la parafinicidad de las fracciones de aceite lubricante. El principio de hidrogenación ha sido utilizado para la combinación de hidrocarburos de una clase con los de otra, en la polimerización y la sintesización del isooctano e isopentano. La hidrogenación está limitada casi exclusivamente a este servicio, en lo que atañe a su aplicación a la manufactura de combustibles de motor.

KEROSINA

La persona que haya observado el progreso que la refinería de petróleo ha conquistado estos últimos 30 años está, naturalmente, muy propensa a asociar la antigua refinería con la manufactura de kerosina y la moderna refinería con la manufactura de gasolina.

El ensanchamiento del mercado de la kerosina ha sido posible sólo reconociendo la utilidad de este producto en otras aplicaciones afuera del alumbrado o iluminación. Importantes nuevos mercados para la venta de kerosina la consumen en la forma de combustible para tractores, combustible para incubadores, absorbente de gas, combustible para estufas portátiles, etc. En cada caso, se exige un producto de punto final bajo. Los pedidos estipulan generalmente que la kerosina ha de tener un contenido mínimo de azufre,

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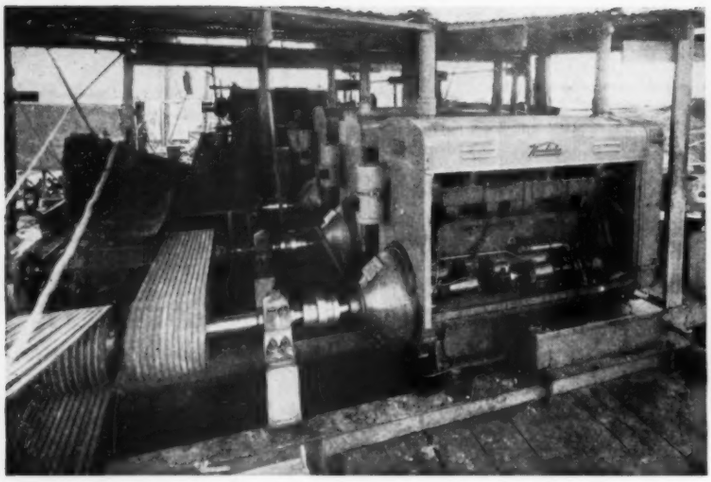

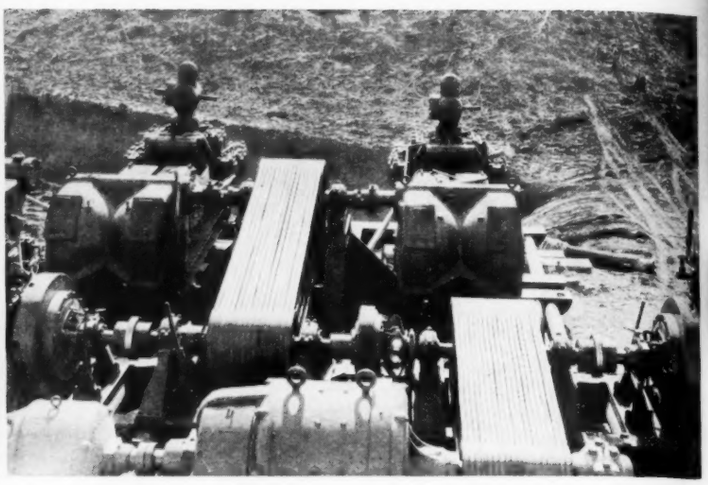

More TWIN DISC CLUTCHES are in use in Oil Field Service *than all other makes combined*

Because twelve years' extensive experience in the oil fields and an intimate knowledge of the industry's requirements have enabled Twin Disc engineers to design clutches and power take-offs that are successfully standing up under the most gruelling conditions. Write for specific recommendations. Engineering data on request.

POWER TAKE-OFF UNITS

The use of high speed multi-cylinder engines in oil well pumping service demands a self-contained power take-off unit as a link in the drive between engine and pumping rig—for efficient starting . . . easy picking up of the load . . . and satisfactory application of pulley or V-belt drive. Complete clutch power take-off assembly, mounted in rigid, cast iron housing, constitutes a self-contained unit. All anti-friction bearings are selected with liberal safety factors to insure long life. Twin Disc Power Take-Offs are applicable to industrial engines having S.A.E. flywheel housing dimensions. Write for Bulletin No. 105.

MODEL "E" CLUTCHES

Twin Disc Model "E" Clutches incorporate the latest features in clutch design and provide greatest possible ruggedness. Over-all dimensions are held to a minimum to conserve installation room. Maximum bores are large enough to accommodate oversize shafts. Enclosed feature permits operation in the open without special housings or guards. Needle bearings at pivot points of clutch levers, and hardened and ground parts in the engaging mechanism, assure easy engaging action. Available in single and two plate assemblies, from 14" to 42" in diameter; sizes suitable for a range of from 13 to 280 h.p. per 100 rpm. Write for Bulletin No. 108

Davantage d'EMBRAYAGES TWIN DISC sont employés en service de champ pétrolifère *que toutes les autres marques ensemble.*

La raison en est que douze ans d'expérience variée sur les champs pétrolifères et une connaissance intime des besoins de l'industrie ont permis aux ingénieurs Twin Disc de mettre au point des embrayages et des prises de force motrice qui résistent brillamment dans les conditions d'emploi les plus dures. Demandez-nous nos recommandations spécifiques. Données techniques sur demande.

APPAREILS DE DÉMARRAGE

L'emploi de moteurs de grande vitesse à cylindres multiples en service de pompage de puits pétroliers exige un groupe de prise de force motrice autonome comme liaison dans la transmission entre le moteur et l'appareillage de pompage—et cela afin de réaliser un démarrage efficace . . . un entraînement facile de la charge . . . et une application satisfaisante de la commande à poulie ou à courroie trapézoïdale. L'ensemble complet de prise de force motrice d'embrayage, monté dans un carter rigide, en fonte, forme un groupe autonome. Tous les paliers antifriction sont sélectionnés avec tous facteurs de sécurité amplement calculés pour assurer une longue vie utile. Les prises de force motrice Twin Disc peuvent s'appliquer aux moteurs industriels ayant les cotes S.A.E. du carter de volant. Bulletin No. 105 sur demande.

EMBRAYAGES MODELE "E"

Les embrayages Twin Disc Modèle "E" Possèdent les tout derniers perfectionnements en construction d'embrayages et offrent toute la robustesse qu'on puisse désirer. Les dimensions extérieures sont aussi réduites que possible pour épargner la place dans la salle d'installation. Les alésages maximums sont assez grands pour recevoir les arbres à surépaisseur. Le mécanisme étant complètement enfermé, on n'a pas besoin, pour l'emploi au dehors, d'avoir recours à un carter ou protecteur spécial. Des paliers à aiguilles prévus aux points de pivotement des leviers d'embrayage, ainsi que des pièces trempées et rectifiées dans le mécanisme d'engagement, assurent une mise en prise facile. Offerts en groupes monodisque et à double disque, de 14 à 42 pouces de diamètre; gamme de tailles correspondant à une gamme de 13 à 280 CV à 100 t/m. Bulletin No. 108 sur demande.

Hay más EMBRAGUES TWIN DISC dedicados al servicio en campos petrolíferos, *que el total de todas las demás marcas juntas.*

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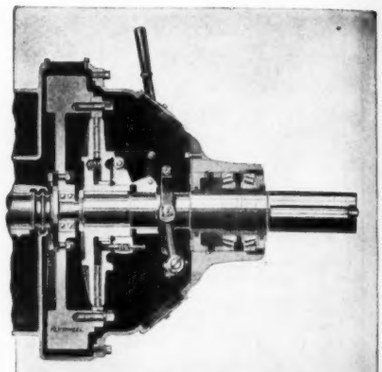
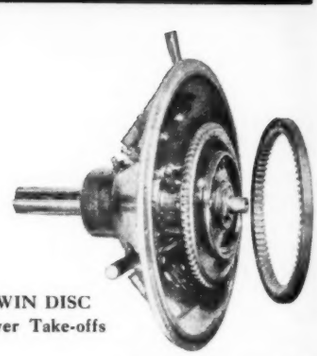
El empleo de motores de alta velocidad, de cilindros mútiples, en la instalación de bombas de pozos petroliferos, exige un grupo de tomador de fuerza motriz independiente, como eslabón en la transmisión entre el motor y el equipo de bomba, a fin de realizar un arranque eficaz, un manejo fácil de la carga y una aplicación satisfactoria de la transmisión o propulsión por polea o correa trapezoidal. El grupo completo de tomador de fuerza motriz de embrague, instalado en una caja rígida, de hierro fundido, forma una instalación independiente muy útil. Todos los cojinetes antifricción comprenden todos los factores de seguridad ampliamente calculados para asegurar una gran duración efectiva. Los tomadores de fuerza motriz Twin Disc pueden aplicarse a motores industriales con cajas de volante de dimensiones según los patrones de la S.A.E. Sírvase pedirnos nuestro boletín No. 105.

EMBRAGUES, MODELO "E"

Los embragues Twin Disc de modelo "E" poseen todos los más recientes perfeccionamientos en construcción de embragues y ofrecen toda la resistencia y duración que se pueda desear. Las dimensiones totales se han reducido lo más que se ha podido, para ahorrar espacio en la sala de instalación. Las admisiones son bastante grandes para recibir árboles de sobretamaño. El mecanismo, por estar completamente encerrado, no requiere tapas o protectores, al emplearse en puntos descubiertos. Los cojinetes de agujas en que funcionan los pivotes de las palancas de embrague, lo mismo que las piezas endurecidas y esmeriladas del mecanismo de acoplamiento, aseguran una fácil acción segura y expedita. Se ofrecen en grupos monodiscos y de disco doble, de 14 a 42 pulgadas de diámetro, en capacidades correspondiente a una escala de potencia de 13 a 280 c. de f. por 100 r.p.m. Sírvase pedirnos nuestro boletín No. 108.



TWIN DISC POWER TAKE-OFF SECTIONAL VIEW



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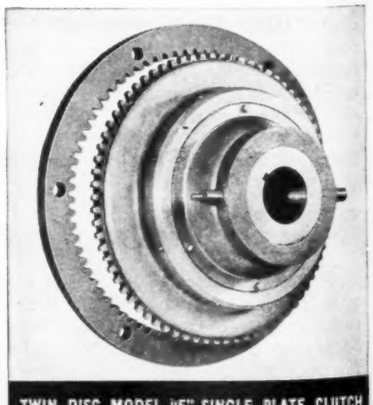

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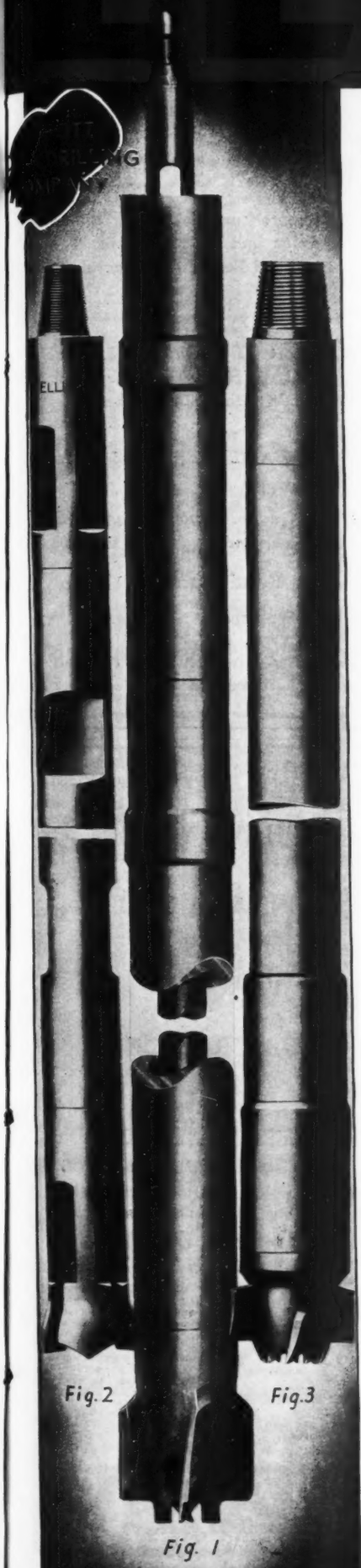

ELLIOTT WIRE LINE RETRACTABLE CORING DRILL and DRILLING ASSEMBLY

(FIG. 1)

The latest and most important coring development in Elliott history. Saves time and money by eliminating many round trips of the drill pipe when coring; and can be converted into a drilling bit by replacing the inner barrel with the drilling assembly. When coring, the inner barrel is *dropped* in the hole instead of being run in on the drill pipe, requiring about one minute per 500/1200 feet to run in and seat in coring position in drill collar assembly on bottom of hole. Inner barrel with core is retrieved by overshot assembly on wire line.

Actual field service over a period of many months proves the Elliott Wire Line Core Drill recovers superior cores in less time and with less weight than all other types of coring equipment, due to three outstanding and exclusive Elliott features*. Due to a minimum number of parts there are less operating difficulties, while maintenance costs and "down time" are only a fraction of that of other types of core drills.

*1—NEW IMPROVED CUTTER HEADS: Soft formation and rock types; which protect the core from circulation wash; drill faster and straighter hole; and make more footage before becoming dull.

*2—INNER BARREL: Streamlined to insure fast running-in and retrieving; and embodies no driving mechanism or moving parts, assuring freedom from operating difficulties.

*3—NOVEL INNER BARREL VALVE: Which creates a suction that actually assists the entry of cores into the inner barrel; assuring maximum recovery of good cores. Write for Bulletin No. 37-W.

ELLIOTT CABLE TOOL CORE DRILL

(FIG. 2)

Proved by its superior performance to be one of the most outstanding developments ever produced for cable tool coring; enabling cable tool operators to recover good cores as easily and economically as rotary drillers have been accustomed to do for many years. Designed by one of the most successful cable tool drillers, and backed by Elliott's long experience in conducting a successful coring service to oil companies. For complete information, sizes, etc., write for Bulletin No. 37-CT.

ELLIOTT COMBINATION ROTARY CORE DRILL

(FIG. 3)

The ultimate result of nearly twenty years of actual coring experience in the field. A scientifically designed tool, manufactured of the best materials, and engineered to meet actual conditions in the hole. Simple; rugged; designed for the toughest service with a high factor of safety. Makes fast hole and high recoveries of good cores in all formations and under the widest range of operating conditions. Hard and soft formation cutter heads are interchangeable, providing one set of coring equipment for all formations. Write for Bulletin No. 36-R.

BARRENA ELLIOTT DE SACAR MUESTRAS, DE TIPO RETRACTABLE ACCIONADO POR CABLE, Y CONJUNTO DE PERFORACION

(FIG. 1)

El más reciente e importante progreso en equipo de sacar muestras en la historia de la compañía Elliott. Ahorra tiempo y gastos suprimiendo muchos viajes de ida y vuelta del tubo de perforación al sacar muestras; puede convertirse en barrena instalando el conjunto o grupo de perforación en lugar del cilindro o tubo interior. Para sacar muestras, el tubo interior se deja *caer* en el hoyo, en lugar de pasarlo por el tubo de perforación, requiriendo como un minuto por cada 500 a 1200 piés, para bajar y quedar colocado en posición de trabajo en el collar del grupo de perforación en el fondo del hoyo. El cilindro interior con la muestra se recobra por el mecanismo disparador en el cable.

El trabajo práctico durante muchos meses ha comprobado que la barrena Elliott de sacar muestras, accionada por cable, recupera muestras superiores en menos tiempo y con menor peso que todo otro equipo de sacar muestras del mercado, debido a tres* rasgos exclusivos del proyecto Elliott. Debido a un número mínimo de piezas, hay menos dificultades de funcionamiento, mientras los gastos de conservación y tiempo de espera representan sólo una fracción del costo de otros tipos de barrenas para sacar muestras.

*1—NUEVOS CABEZALES DE BARRENA PERFECCIONADOS: En tipos para formaciones blandas y formaciones rocosas duras; protejen la muestra contra la circulación líquida; perforan con mayor rapidez y en línea más recta, abarcando una mayor extensión antes de desgastarse.

*2—CILINDRO INTERIOR: De forma perfilada, para asegurar su rápida introducción y extracción; no comprende ningún mecanismo de propulsión ni piezas móviles, asegurando independencia completa de dificultades en el funcionamiento.

*3—NUEVA VALVULA EN EL CILINDRO INTERIOR: Establece una aspiración que verdaderamente es ayuda muy efectiva en la admisión de las muestras en el cilindro interior; asegura una recuperación máxima de buenas, muestras. Pídanos nuestro boletín No. 37-W.

BARRENA ELLIOTT DE SACAR MUESTRAS ACCIONADA POR CABLE

(FIG. 2)

Su excelente funcionamiento ha demostrado que es una de las más sobresalientes innovaciones en el ramo de herramientas de cable para sacar muestras. Habilita a los explotadores para recuperar muestras excelentes, con la misma facilidad y economía de que han gozado los dueños de equipos rotativos desde hace años. Ha sido proyectada por una de las principales empresas de perforación con herramientas de cable y lleva la garantía de la Elliott, basada en vasta experiencia en el suministro de equipos de sacar muestras a las grandes compañías de petróleo. Para información completa sobre tamaños, etc., pídanos nuestro boletín No. 37-CT.

COMBINACION ELLIOTT DE BARRENA ROTATIVA DE SACAR MUESTRAS

(FIG. 3)

Representa el resultado culminante de casi veinte años de experiencia práctica en sacar muestras. Una herramienta científicamente proyectada y manufacturada de los mejores materiales. Está calculada para sobreponerse a las más exigentes condiciones del trabajo. Sencilla, fuerte y preparada para el servicio más difícil, con amplio factor de seguridad. Perfora con suma rapidez y recupera excelentes muestras en toda clase de formaciones y bajo las más variadas condiciones de operación. Los cabezales de barrena para formaciones duras y blandas son intercambiables, constituyendo un solo juego de herramientas de sacar muestras para toda clase de formaciones. Pídanos nuestro boletín No. 36-R.

FORET DE CAROTTAGE A RAPPEL et ENSEMBLE DE FORAGE SUR CABLE ELLIOTT

(FIG. 1)

Le dernier et le plus décisif progrès en carottage depuis qu'Elliott existe. Il fait gagner du temps et de l'argent en supprimant bien des allées-et-venues du tuyau de foret lors du carottage, et peut être converti en un trépan de forage en remplaçant le tube intérieur par l'ensemble de forage. Quand on carotte, on *laisse tomber* le tube intérieur dans le puits au lieu de le descendre sur le tuyau de foret, ce qui prend environ une minute par 500/1200 pieds pour descendre et amener en position de carrottage dans l'ensemble de collier de foret au fond du trou. On recueille le tube intérieur avec carotte au moyen du groupe à relevage vertical sur le câble.

De nombreux mois de pratique au chantier prouvent que le foret de carottage sur câble Elliott extrait des carottes supérieures en moins de temps et avec moins de poids que tout autre type d'équipement de carottage grâce à 3 avantages Elliott décisifs et exclusifs.* Grâce à un minimum de pièces il y a moins d'ennuis de manoeuvre, alors que les frais d'entretien et le "temps de descente" ne sont qu'une fraction de ceux des autres types de forets de carottage.

*1—NOUVEAUX PORTE-FORETS PERFECTIONNES: Types pour roc et gisement tendre; protection de la carotte contre le lavage du courant; forage plus rapide et plus droit; plus longue vie utile avant de s'émousser.

*2—TUBE INTERIEUR: Profilé pour assurer descente et remontée rapides; et ne comprend ni mécanisme de commande ni organe mobile, ce que évite tout ennui de manoeuvre.

*3—NOUVEAU TYPE DE SOUPAPE DE TUBE INTERIEUR: Qui crée une succion facilitant vraiment l'entrée des carottes dans le tube intérieur, d'où obtention maximum de bonnes carottes. Bulletin No. 37-W sur demande.

FORET DE CAROTTAGE ELLIOTT D'OUTIL SUR CABLE

(FIG. 2)

Son rendement supérieur en a fait un des progrès les plus notables à ce jour en carottage d'outil sur câble; il permet aux opérateurs d'outils sur câble d'obtenir des bonnes carottes aussi facilement et aussi économiquement que les foreurs rotatifs ont eu l'habitude de le faire pendant des années. Réalisé par un des plus habiles foreurs par outils sur câble et bénéficiant de la longue expérience d'Elliott dans la conduite de service de carottage efficace pour compagnies pétrolières. Pour détails complets, tailles, etc., demander Bulletin No. 37-CT.

FORET DE CAROTTAGE ROTATIF COMBINAISON ELLIOTT

(FIG. 3)

Le résultat final de près de vingt ans d'expérience de carottage pratique sur le chantier. Un outil de tracé scientifique, fabriqué du meilleur matériel et étudié pour répondre aux conditions réelles dans le puits. Simple, robuste, prévu pour le plus rude service avec une forte marge de sécurité. Il assure un forage rapide et de fortes prises de bonnes carottes en toutes formations et dans les conditions de travail les plus variées. Les porte-forets de terrain dur ou tendre sont interchangeables, d'où un jeu unique d'équipement de carottage pour toutes les formations. Bulletin No. 36-R sur demande.

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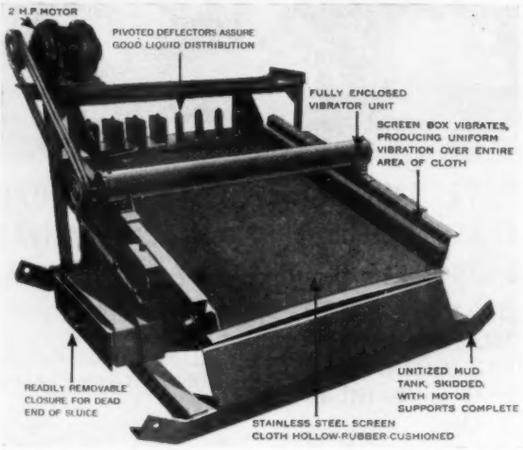
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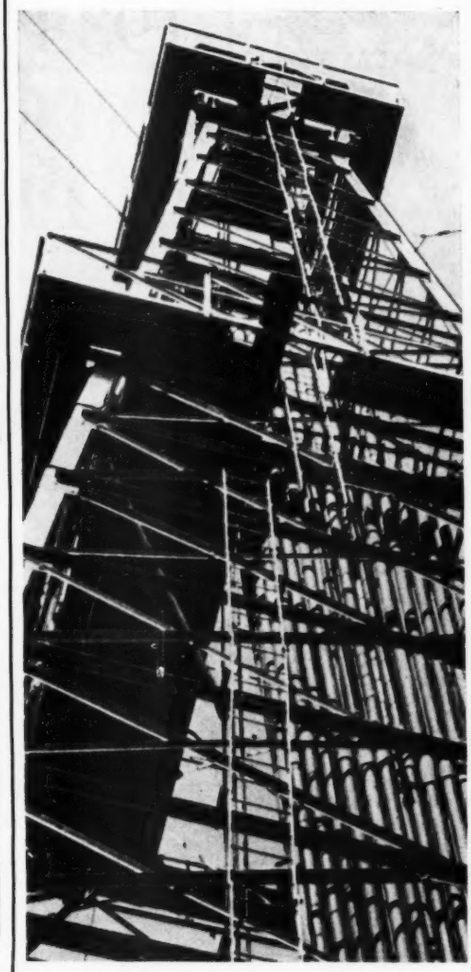

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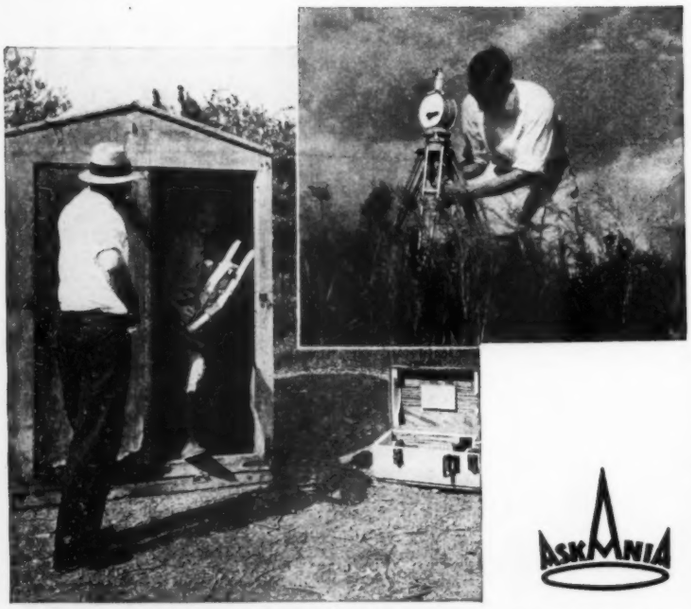


MULTIPLE METHOD

of Subsurface Prospecting an Accepted Procedure

Geophysics helps to limit drilling failures by the selection of the most promising areas for oil and gas accumulation. Many large operating companies use more than one method of subsurface prospecting as an accepted procedure. Why don't you follow this proven, accepted practice in your geophysical work? Askania equipment will help you to reduce guess work and possible errors.

We will gladly confer with you regarding your requirements in geophysical instruments. Ask us for cost data and other information regarding the torsion balance, magnetometer or seismic equipment. A letter or a 'phone call will be handled promptly.

La géophysique est d'un concours précieux pour réduire les forages infructueux, et cela par la sélection des régions qui promettent le plus d'avoir de fortes accumulations de pétrole et de gaz naturel. Un bon nombre de compagnies exploitantes font usage de plusieurs méthodes de prospection du sous-sol d'une façon suivie. Votre intérêt est d'adopter cette pratique démontrée et agréée dans vos travaux géophysiques. Le matériel Askania vous aidera à réduire les tâtonnements et les possibilités d'erreurs.

Nous sommes à votre disposition pour discuter avec vous vos besoins en instruments géophysiques. Demandez-nous les données relatives au coût d'exploitation et autres données sur la balance de torsion, le magnétomètre ou l'équipement sismique. Votre demande aura notre prompte attention.

La geofísica es una ayuda muy efectiva para limitar o reducir las perforaciones infructuosas, mediante la selección de regiones que más prometen en el sentido de acumulaciones de petróleo y gas natural. Muchas grandes compañías explotadoras siguen varios métodos de reconocimiento, como práctica corriente. ¿Por qué no sigue Ud. esta práctica, que ha tenido tanta aceptación, por sus excelentes resultados, en conexión con sus trabajos geofísicos? El equipo Askania le ayudará a reducir sus equivocaciones y posibilidades de errores.

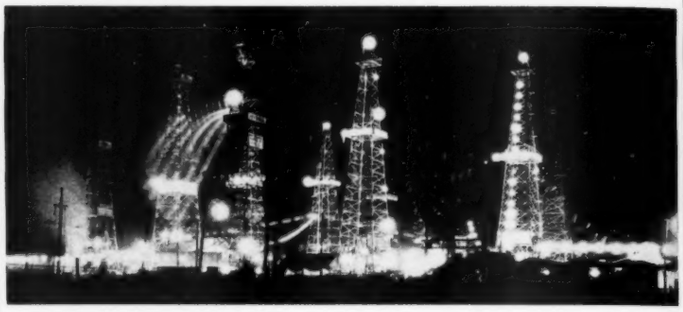
Estamos a su disposición para discutir con Ud. sus necesidades en el sentido de instrumentos goefísicos. Sírvase pedirnos datos relativos al costo de explotación e información detallada sobre la balanza de torsión, el magnetómetro y los instrumentos sísmicos. Su solicitud recibirá inmediata y esmerada atención.

AMERICAN ASKANIA CORPORATION

825-827 M & M BUILDING HOUSTON, TEXAS

1938 INTERNATIONAL PETROLEUM EXPOSITION

TULSA, OKLA., U.S.A., MAY 14-21, 1938



In announcing the 1938 International Petroleum Exposition, the officers and management of the "World's Fair of the Oil Industry" assures the greatest exposition of new methods, machinery and equipment in the history of *the world's first, greatest, oldest and only International oil show.* The 1938 Exposition, marking the fifteenth anniversary of the founding of the greatest exposition devoted to any single industry in the world, will present an almost unbelievable advancement in efficiency, economy, speed and safety in the geophysical, producing, refining, transportation and marketing branches of the great petroleum industry. The board of directors respectfully invites your attendance and participation.

INTERNATIONAL PETROLEUM EXPOSITION
Signed: W. G. SKELLY, President.

l'Exposition Internationale du Pétrole de 1938

En faisant l'annonce de l'Exposition Internationale du Pétrole de 1938, les organisateurs et la direction de la "Foire Mondiale de l'Industrie Pétrolière" promettent l'exposition la plus grandiose des nouvelles méthodes, machines et matériel qui ait jamais encore été organisée depuis *la première foire internationale du pétrole, la plus vaste, la plus ancienne et la seule au monde.* L'exposition de 1938, qui marquera le 15ème anniversaire de la fondation de la plus grandiose foire du monde consacrée à une industrie isolée, révèlera des progrès quasi-incroyables en rendement, économie, rapidité et sécurité dans les branches de la géophysique, de la production, du raffinage, du transport et de la vente relevant de la grande industrie du pétrole. Le conseil d'administration vous invite cordialement à assister et à participer.

EXPOSITION INTERNATIONALE DU PETROLE
Signé: W. G. SKELLY, Président.

Exposición International del Petróleo de 1938

Al hacer el anuncio de la Exposición International del Petróleo de 1938, los organizadores y la dirección de la "Feria Mundial de la Industria Petrolera" prometen la exhibición más vasta de nuevos métodos, máquinas y material de todas las que se hayan presentado hasta ahora. *Será la exposición internacional del petróleo más grande e importante en la historia de la industria y la única en el mundo de su caracter internacional.* La exposición de 1938, que señalará el décimo quinto aniversario de la fundación de la más grandiosa feria del mundo consagrada a una sola industria, revelará progresos casi increibles en rendimiento, economía, rapidez y seguridad en todas las ramificaciones de la industria: geofísica, producción, refinería, transporte y venta de productos petrolíferos. La junta directiva de esta Exposición le invita a Ud. a asistir y tomar activa participación en ella.

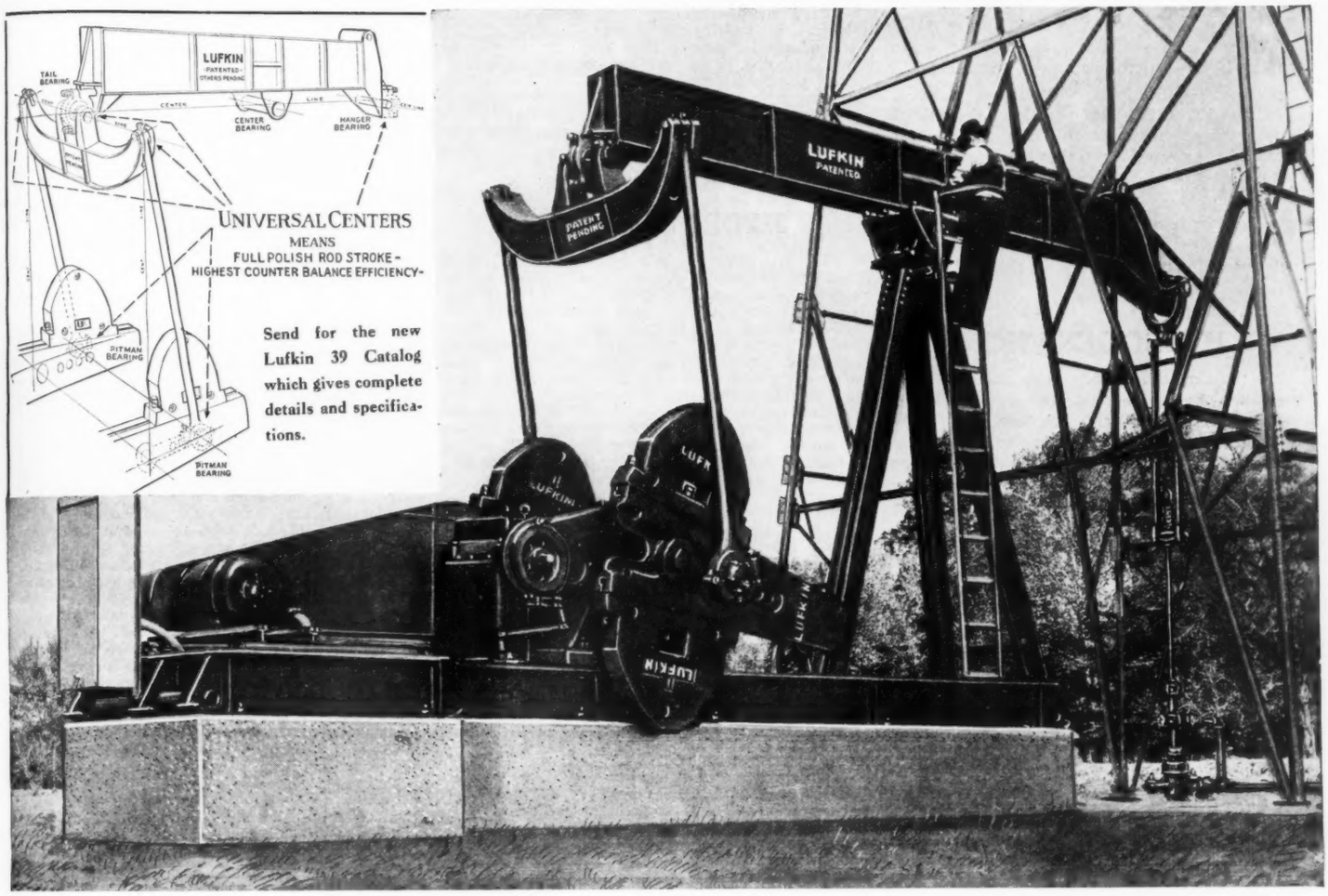
EXPOSICION INTERNACIONAL DEL PETROLEO
Firmado: W. G. SKELLY, Presidente.

TULSA, OKLAHOMA, U.S.A.
MAY 14-21, 1938

For Advance Information write

Wm. B. Way, General Manager, Tulsa, Oklahoma, U.S.A.

Universal LUFKIN Unit Assemblies



Unretouched photo of typical Lufkin installation

LUFKIN—Pioneers in Geared Units

The first Lufkin geared unit for oil field pumping was installed in a Texas oil field in 1924. This was the first reduction gear unit to ever successfully operate in deep production. Since that time Lufkin Units have been installed in every major field of the world and today are considered standard equipment by more than three hundred major operators in domestic and foreign fields. So completely has the LUFKIN GEARED UNITS revolutionized the method of pumping oil wells, that it is now conceded by engineers high in the oil industry, that geared units are the modern accepted medium by which power is transferred from the prime mover to the polish rod.

Lufkin gear units are principally of the Herringbone type, but are also furnished in worm gear type and are manufactured in sizes to suit any field condition from shallow production to the world's deepest wells. Central geared pumping powers are available from 50 to 150 horsepowers.

Auxiliary equipment such as beams, posts, pitmans and all types of surface equipment are also manufactured in the most improved types.

EXPORT SERVICE

All equipment for export are carefully crated in steel-bound and bolted crates conforming to custom regulations of countries to which shipped. Export offices are maintained in New York at 149 Broadway.

Photo non retouchée d'une installation Lufkin typique.

LUFKIN—Pionniers en groupes à engrenages

Le premier groupe Lufkin à engrenages pour pompage pétrolier a été installé dans un champ de pétrole du Texas en 1924. Ce groupe a été le premier groupe à engrenages démultiplicateurs qui ait fonctionné avec succés en production de puits profonds. Depuis lors, les groupes Lufkin ont été installés dans tous les champs pétroliers importants et sont considérés à l'heure actuelle comme matériel standard par plus de trois cents exploitants d'élite dans les champs de pétrole nationaux et étrangers. Les GROUPES A ENGRENAGES LUFKIN ont révolutionné à tel point le mode de pompage des puits de pétrole que les ingénieurs pétroliers leur accordent la première place dans la branche et que les groupes à engrenages sont maintenant le mécanisme moderne approuvé au moyen duquel l'énergie est transmise du groupe-moteur à la tige dite polisseuse.

Les groupes à engrenages Lufkin sont surtout du type à chevrons, mais sont aussi offerts du type à engrenages à vis sans fin; en outre, ils sont offerts en tailles convenant à toutes les conditions possibles d'exploitation depuis les puits peu profonds jusqu'aux puits de la plus grande profondeur au monde. Il est offert des groupes-force centraux de pompage à démultiplication, allant de 50 à 150 CV.

L'équipement auxiliaire, comme les poutrelles, les montants, les pitmans et tout genre d'équipement de surface, est aussi fabriqué en types des plus perfectionnés.

SERVICE D'EXPORTATION

Tout matériel destiné à l'exportation est logé avec soin dans des caisses à clairevoie cerclées d'acier et boulonnées en conformité avec les exigences douanières des pays destinataires. Les bureaux d'exportation sont à New York, 149 Broadway.

Fotografía sin rectocar de una instalación típica "Lufkin."

LUFKIN—Los primeros en grupos de engranajes

El primer grupo de engranajes Lufkin, para bombaje de petróleo, fué instalado en un campo petrolífero de Texas en 1924. Este grupo fué el primer mecanismo o equipo de engranajes desmultiplicadores en funcionar con éxito en la extracción de petróleo de pozos profundos. Desde entonces, los equipos Lufkin se han instalado en casi todos los campos petrolíferos más importantes y se consideran actualmente como la norma de la industria por más de trescientas importantes empresas petroleras nacionales y extranjeras. Los GRUPOS DE ENGRANAJES LUFKIN han revolucionado el método de bombaje de los pozos de petróleo hasta el punto de que los ingenieros del ramo les acuerdan el primer lugar en su campo, reconociendo que son los mecanismos modernos y eficaces para la transmisión de la energía del motor al sistema de aspiración.

Los equipos de engranajes desmultiplicadores o de reducción Lufkin son principalmente del tipo de espina de pez, pero se ofrecen también en tipo de tornillo sin fin. Por otra parte, se ofrecen también en tamaños convenientes a todas las condiciones posibles de explotación, para pozos de baja profundidad, lo mismo que para los pozos más profundos del mundo. Ofrecemos grupos motores centrales de bombaje con capacidades de 50 a 150 c. de f.

El equipo auxiliar, como balancines, montantes, bielas de conexión y otros accesorios de instalación exterior, se ofrece también en modelos o tipos notablemente perfeccionados.

SERVICIO DE EXPORTACION

Todo material destinado a la exportación se empaca con sumo cuidado en huacales bien sujetos por precintas de acero y pernos, en conformidad con las exigencias aduaneras de los países de destino. El departamento de exportación está en 149 Broadway, Nueva York, N. Y., E. U. A.

LUFKIN FOUNDRY & MACHINE CO., LUFKIN, TEXAS

NEW YORK CITY	LOS ANGELES	HOUSTON	DALLAS	TULSA
A. V. Simonson	E. P. Trout	C. B. Edwards	L. A. Little	D. A. Reid
149 Broadway	5959 Alameda	806 Second Natl. Bank	1016 Kirby Bldg.	719 Thompson Bldg.

OTHER OFFICES IN PRINCIPAL OIL FIELDS.

gether with the tendency to reduce costs, that revisions in the conventional doctor treatment or acid and doctor treatment have been developed.

The use of copper chloride as a treating reagent gained impetus in the past year, particularly on vapor recovery and natural gasoline.

Expanded use has been made of the sulfuric acid treating method whereby the acid and oil contact is held for a very short time and then complete separation is effected by centrifuging.

Treating procedures for the manufacture of gasoline have been essentially designed in the most recent months for the conservation of octane values and the reduction of unit chemical costs.

HYDROGENATION

In the United States hydrogenation of heavy residuum oils for the manufacture of ordinary motor fuels and lubricants has been found to be unable to compete on a cost basis with the manufacture of these by cracking but in several foreign countries, the hydrogenation of coal tars has reached substantial proportions to produce motor fuels.

Hydrogenation in this country has been used to produce diesel engine fuels and through this means it has been possible to improve the parafinicity of diesel oil distillate which in turn improved their knock characteristics.

Hydrogenation has also become useful in increasing the paraffinicity of lubricating oil fractions. The principle of hydrogenation has been utilized in combining hydrocarbons of one class with those of another in the polymerization and synthesizing of isooctane and isopentane and to this service hydrogenation is now almost exclusively limited so far as hydrogenation applies to the manufacture of motor fuels.

KEROSENE

Anyone who has seen the progress oil refining has made within the past 30 years can not help but associate early refining with the manufacture of kerosene and present day refining with the manufacture of gasoline.

Expansion of the kerosene market has been made possible by recognizing its usefulness in fields other than illumination. Important new fields for kerosene sales have been as a tractor fuel, incubator fuel, gas absorbent, portable stove fuel, etc. In each instance relatively low endpoint product was demanded. Exceptionally low sulfur content specifications usually accompanied purchase orders and the result has been the need for improving the manufacturing technique. To this end more effective fractionation has been utilized in the initial distillation of the crude and the resulting distillate has been more thoroughly treated chemically than ever before.

The use of sulfur dioxide for the treatment of especially high sulfur bearing oils has resulted in manufacturing kerosenes of exceptionally low sulfur content.

DISTILLATE FUEL OILS

In contrast with the lesser relative importance of kerosene manufacture, the refining industry has witnessed a call for greatly increased volumes of furnace oils, tractor fuels and diesel fuels. In the manufacture of the latter, first consideration has been given to the choice of crude oils and the greater bulk of these have been distilled directly from the crude in contrast with the manufacture

(Continued on Page 269)

dernier, en particulier en récupération de vapeurs et en essence naturelle.

On a fait de plus en plus usage de la méthode de traitement à l'acide sulfurique selon laquelle on ne laisse l'acide et le pétrole en contact que très peu de temps, puis on effectue la séparation complète par centrifugation.

Les procédés de traitement employés durant ces derniers mois en fabrication d'essence ont tendu surtout à la conservation des valeurs en octane et à la réduction des prix de revient chimiques unitaires.

HYDROGENATION

Aux Etats-Unis, on a dû constater que l'hydrogénation des huiles lourdes résiduaires pour la fabrication des carburants moteurs et lubréfiants courants n'était pas à même de soutenir la concurrence, pour le prix de revient, de ces mêmes produits préparés par cracking, mais dans plusieurs pays de l'étranger, l'hydrogénation des goudrons de houille a pris une place importante dans la production des carburants moteurs.

En Amérique, on a employé l'hydrogénation pour fabriquer les carburants de moteurs Diesel, et par ce moyen il a été possible d'améliorer la paraffinicité du distillé d'huile Diesel, ce qui a à son tour amélioré leurs caractéristiques de cognage.

L'hydrogénation est aussi devenue utile aux fins d'augmenter la paraffinicité des fractions d'huile lubréfiante. Le principe de l'hydrogénation a été utilisé pour combiner des carbures d'hydrogène d'une classe donnée axec ceux d'une autre, dans la polimérisation et la synthèse de l'isooctane et de l'isopentane, et c'est à cet emploi que l'hydrogénation se limite maintenant presque exclusivement pour ce qui est de l'application de l'hydrogénation à la fabrication des carburants moteurs.

PETROLE LAMPANT

Toute personne qui a eu l'occasion d'observer les progrès du raffinage du pétrole au cours des 30 dernières années ne peut s'empêcher d'associer le raffinage du début de l'industrie avec la fabrication du pétrole lampant et le raffinage de notre époque avec la fabrication de l'essence.

L'expansion des débouchés du pétrole lampant ou kérosine est devenue possible du jour où on en a reconnu l'utilité dans d'autres domaines que l'éclairage. D'importants débouchés nouveaux pour la vente de la kérosine ont été comme carburant de tracteur, combustible d'incubateur, absorbant de gaz, combustible de fourneaux portatifs, etc. Dans chaque cas il fallait un produit ayant un point maximum relativement bas. En outre, les commandes spécifient en général une teneur très faible de soufre, d'où il est résulté qu'on a dû chercher à améliorer la technique de fabrication. A cette fin on a utilisé un fractionnement plus efficace lors de la distillation initiale du pétrole brut en on a fait subir au produits de distillation un traitement chimique plus poussé que par le passé.

L'emploi de l'anhydride sulfureux liquide pour le traitement de pétroles à teneur de soufre particulièrement forte a permis de fabriquer des kérosines d'une teneur en soufre exceptionnellement faible.

FUEL OILS DE DISTILLATION

Faisant contraste avec la moindre importance relative de la fabrication du pétrole lampant, l'industrie du raffinage a été témoin d'une demande en volumes fortement accrus d'huiles combustibles, de carburants de tracteur et de carburants Diesel. Dans la fabrication de ces derniers, le principal souci a été le choix des pétroles bruts, et la plus grande partie en a été distillée directement du pétrole brut par contraste avec la fabrication de la majeure portion de l'essence. La demande en huiles combustibles de faible point d'inflammabilité a tendu à enrayer la tendance générale vers un fractionnement plus poussé. Dans les cas où le fractionnement de l'huile combustible avait été poussé plus loin qu'on ne le désirait, la pratique courante a été d'y réintroduire quelques fractions légères aux fins de réduire le point d'inflammabilité du mélange. Toutefois, cette dernière méthode n'était recommandée que dans les cas où on était en mesure de faire une sélection soignée du produit de dosage.

(Continué sur Page 269)

y esta exigencia ha impuesto la necesidad de perfeccionar la técnica en la manufactura del producto. Para este fin, se utiliza una fraccionación más efectiva en la destilación inicial del petróleo crudo y el destilado resultante recibe un tratamiento químico más completo que antes.

El empleo de bióxido de azufre líquido para el tratamiento de petróleos que tienen un alto contenido de azufre, ha resultado en la producción de kerosinas con un porcentaje mínimo de azufre.

PETROLEOS COMBUSTIBLES DESTILADOS

En contraste con la menor importancia relativa de la manufactura de kerosina, la industria de la refinación ha presenciado una llamada a una creciente producción de petróleos para hornos, combustibles para tractores y motores diésel. En la manufactura de los últimos, se ha dado particular consideración a la elección de los petróleos crudos, y la mayor parte de estos combustibles ha sido destilada directamente del petróleo crudo, en contraste con la manufactura de la mayor parte de la gasolina. La demanda de petróleos combustibles de bajo punto de inflamación a tendido a derrotar la tendencia general hacia una fraccionación más avanzada. En aquellos casos en que la fraccionación del petróleo combustible ha ido más allá de un cierto punto deseado, la práctica corriente ha sido de reintroducirle algunas fracciones más volátiles con el objecto de reducir el punto de inflamación de la mezcla. Este último método no se ha tenido por conveniente sino en el caso en que se ha podido hacer una elección cuidadosa del producto por mezclarse.

Se da preferencia a un producto de dosificación de una composición que sea lo más próxima posible a la del producto de base. En las grandes refinerías se han hecho importantes cantidades de petróleos combustibles por el procedimiento de cracking. Donde se acostumbrada a someter a una nueva destilación el destilado bajo presión, se han resogido los fondos o fracciones pesadas como petróleos combustibles.

En general, a los petróleos combustibles se ha aplicado un tratamiento químico que emplea únicamente una solución de plombita. Aquellos que habian sido obtenido directamente el petróleo crudo o durante el procedimiento de cracking, han sido generalmente tratados por una solución de plombita, mientras que aquellos que habian sido recuperados como fondos tratados de destilado bajo presión han sido sometidos nada más que a un lavado cáustico.

COMBUSTIBLES PESADOS

Es difícil fijar una línea de demarcación exacta entre los petróleos livianos y los petróleos combustibles pesados, pero en la presente discusión, los petróleos residuarios se clasifican como "pesados." Estos combustibles son, en gran parte, el residuo de las operaciones de cracking y tienen naturalmente un punto de congelación bajo, característica que los hace más aceptables.

Los combustibles producidos por el procedimiento de cracking contienen cantidades relativamente grandes de materia sólida, principalmente, coque finamente dividido. A pesar de que esta característica no es conveniente, esto, sin embargo, no ha limitado el empleo de estos combustibles en la industria y otras aplicaciones. La calidad de estos combustibles, por otra parte, ha sido notablemente mejorada por el empleo de hornos de cracking de construcción perfeccionada para reducir a un nímimo la formación de coque.

LUBRICANTES

Los principales progresos realizados en la técnica de la fabricación de aceites de motor han sido la adopción general de la refinación de solventes y la desparafinación de solventes, lo mismo que el empleo generalizado de productos de adición para mejorar las propiedades o características específicas de los aceites. Digno de particular atención es el creciente empleo del furfural como solvente. Las instalaciones modificadas de solvente de bióxido de azufre continúan ocupando un puesto relativamente importante y las instalaciones modificadas de solvente de fenol han tratado crecientes cantidades aceites.

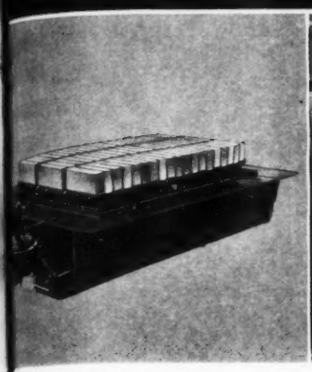
El empleo de productos de adición en los aceites

(Continué en Página 269)

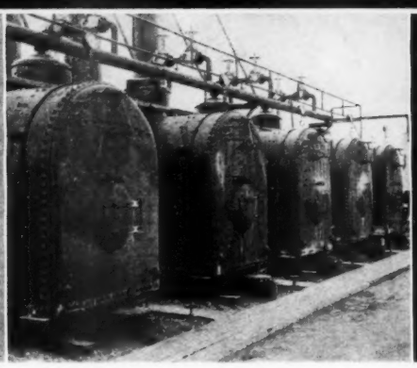
FOR AUTOMATICALLY FIRING GAS FIRED OIL FIELD BOILERS

NATURAL GAS EQUIPMENT

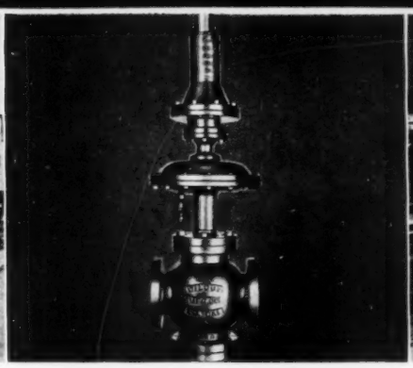
HAS SUCCESSFULLY PIONEERED AND PROVED THESE TWO PRODUCTS



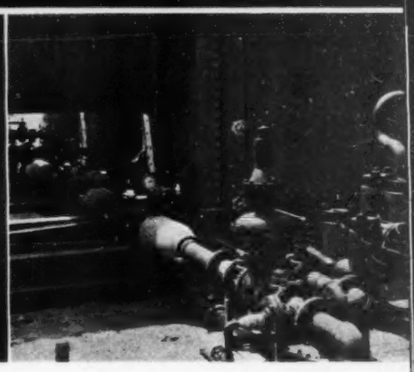
N.G.E.-Nelson Series 1000 Gas Burner



A typical installation of this burner



The N.G.E. Type G-1000 Gas Regulator



A typical installation of this regulator

THE N.G.E.-NELSON SERIES 1000 GAS BURNER

A Portable and High Capacity Heavy Duty Gas Burner

This gas burner for oil field boilers consists essentially of a heavy sheet steel box or frame in which is placed the gas header, burner manifolds, burners and radiant refractories. The gas header in the box is provided with a 3" connection. The burner proper is a modification of the venturi tube. After mixing the air and gas in correct proportions, the mixture is impinged on a bed of refractory which is heated to incandescence. Safe, automatic and accurate air and gas supply is obtained by the use of an automatic damper operator. Only 45 minutes is required for the average installation. No combustion chamber, no brickwork or masonry, and only a minimum of pipe connections are required. The entire unit is portable and may be removed for reinstallation. The manifolding flexibility of individual burners suit it to installation in any type, size or make of boiler without alteration. The burner is supplied as a complete unit, as illustrated. Available in two sizes: 12"x46"x76" and 12"x46"x94". Request specifications and literature. Patented and Patents Pending.

LE BRULEUR A GAZ N.G.E.-NELSON SERIE 1000

Un brûleur à gaz de service dur, portatif et de fort débit.

Ce brûleur à gaz pour chaudières de champs à pétrole consiste essentiellement d'un coffre ou bâti en forte tôle d'acier dans lequel on place la culasse de gaz, les collecteurs de brûleur, les brûleurs et les réfractaires radiants. La culasse de gaz dans le coffre est munie d'un raccord de 3 pouces. Le brûleur lui-même est une modification du diffuseur dit venturi. Après que le mélange d'air et de gaz s'est fait en doses correctes, il passe sur une couche de réfractaire chauffée à l'incandescence. L'alimentation sûre, automatique et précise de l'air et due gaz est assurée par l'emploi d'une commande d'étouffoir automatique. Une installation moyenne ne demande que 45 minutes. Ni chambre de combustion, ni briquetage ou maçonnerie, et seulement un minimum de raccords de tuyaux. Le groupe entier est portatif et peut être extrait pour réinstallation. La disposition souple des tuyauteries des brûleurs individuels en permet la pose sur tout type, grandeur ou marque de chaudière sans modification. Le brûleur est fourni comme groupe complet, selon le cliché. Prévu en deux tailles: 12x46x76 pouces et 12x46x94 pouces. Caractéristiques et documentation sur demande. Brevets obtenus et d'autres en instance.

EL QUEMADOR DE GAS N.G.E.-NELSON, SERIE 1000

Un quemado de gas de trabajo pesado, de gran capacidad y portátil.

Este quemador de gas para calderas de campos petrolíferos consiste esencialmente de una caja o bastidor de gruesa lámina de acero, en la cual se colocan la cámara del gas, los tubos múltiples del quemador, los quemadores y los refractores de radiación. La cámara del gas en la caja está provista de una conexión de 3". El mismo quemador es es una modificación del tubo difusor llamado venturi. Después de que la mezcla de aire y de gas se ha hecho en proporciones correctas, se pasa sobre una superficie de material refractario, que está calentada a punto de incandescencia. La alimentación segura, automática y precisa del aire y del gas está asegurada por el empleo de un regulador automático. Sólo se requieren 45 minutos para una instalación corriente. No hay cámara de combustión, ni trabajo de mampostería u obra de ladrillos, y sólo un número mínimo de conexiones de tuberia. El grupo completo es portátil y se presta a fácil transporte para su reinstalación en otro lugar. La disposición flexible de la tubería de los quemadores individuales permite su colocación en todo tipo, tamaño y marca del caldera, sin necesidad de modificación. El quemador se suministra como grupo completo, tal como se ve en el presente grabado. Se ofrece en dos tamaños: de 12x46x76 y de 12x46x94 pulgadas. Características e información detallada a solicitud. Patentes obtenidas y otras pendientes.

THE N.G.E. TYPE G-1000 REGULATOR—THE BOILERTROL

A Combination Reducing and Gas Fuel Regulator

For oil field boilers, the Boilertrol simultaneously performs the control services of a reducing regulator and a gas fuel regulator. Acting as a reducing regulator the Boilertrol accurately and automatically compensates for the most extreme changes in gas supply pressure. Acting as a gas fuel regulator the Boilertrol furnishes boilers with the proper fuel supply at correct pressure in accordance with the steam demands made upon the boilers. Steam pressures are maintained within very close limits. This regulator actually controls the idling fire or minimum burner pressure setting. It is also readily adjusted for any desired maximum burner pressure regardless of upstream gas pressure. Pressure loaded construction completely eliminates all tendency to surge, pulsate or override. Furnished complete with standard cast iron body in 3" size for standard oil field service. Also available in sizes ½" to 10". Request specifications and literature. Patented and Patents Pending.

LE REGULATEUR N.G.E.-TYPE G-1000—LE BOILERTROL

Un régulateur combiné de réduction et de combustible gaz.

Pour les chaudières de champs de pétrole, le Boilertrol remplit à la fois les fonctions de contrôle d'un régulateur de réduction et d'un régulateur de combustible gaz. En tant que régulateur de réduction, le Boilertrol compense automatiquement et avec précision les fluctuations les plus marquées de la pression du débit de gaz. En tant que régulateur de combustible gaz, le Boilertrol assure aux chaudières le débit de combustible convenable à la pression juste en rapport avec la demande de vapeur imposée aux chaudières. Les pressions de vapeur sont maintenues dans les limites très serrées. Ce régulateur contrôle en fait le réglage de foyer ralenti ou de pression de brûleur minimum. On peut aussi le régler instantanément pour toute pression maximum de brûleur minimum. On peut aussi le régler instantanément pour toute pression maximum de brûleurs désirée indépendamment de la pression de gaz remontante. La construction chargée de pression supprime toute tendance à enfler, battre ou surmener. Fourni au complet avec corps en fonte standard de calibre de 3 pouces pour service de champ pétrolier normal. Prévu aussi en dimensions de ½ pouce à 10 pouces. Caractéristiques et documentation sur demande. Brevets obtenus et d'autres en instance.

EL REGULADOR N.G.E. TIPO G-1000—EL BOILERTROL

Un regulador combinado de reducción y de gas combustible.

Para las calderas de campos petrolíferos, el Boilertrol satisface, a la vez, las funciones de control de un regulador de reducción y de un regulador de gas combustible. Actuando como regulador de reducción, el Boilertrol compensa automáticamente y con precisión las fluctuaciones más fuertes de la presión del abastecimiento de gas. Actuando como regulador de gas combustible, el Boilertrol suministra a las calderas correcto abastacimiento de combustible a la presión exacta, de acuerdo con la demanda de vapor impuesta sobre las calderas. Las presiones de vapor se mantienen con una exactitud y seguridad extraordinaria. Este regular controla, en realidad, el régimen de calentamiento moderado o la presión mínima del quemador. Puede también ajustarse con facilidad a cualquiera presión máxima de quemador, que se desee, independientemente de la presión del gas ascendente. La construcción cargada de presión suprime toda tendencia a ondulación, pulsación o trepidación. Se suministra completo, con cuerpo de hierro fundido, en tamaño de 3 pulgadas, para servicio corriente en campo petrolífero. También los ofrecemos en tamaños de ½" a 10". Sírvase pedirnos características e información completa. Patentes obtenidas y otras pendientes.

NATURAL GAS EQUIPMENT, INCORPORATED

PETROLEUM SECURITIES BUILDING, LOS ANGELES, CALIFORNIA, U. S. A.

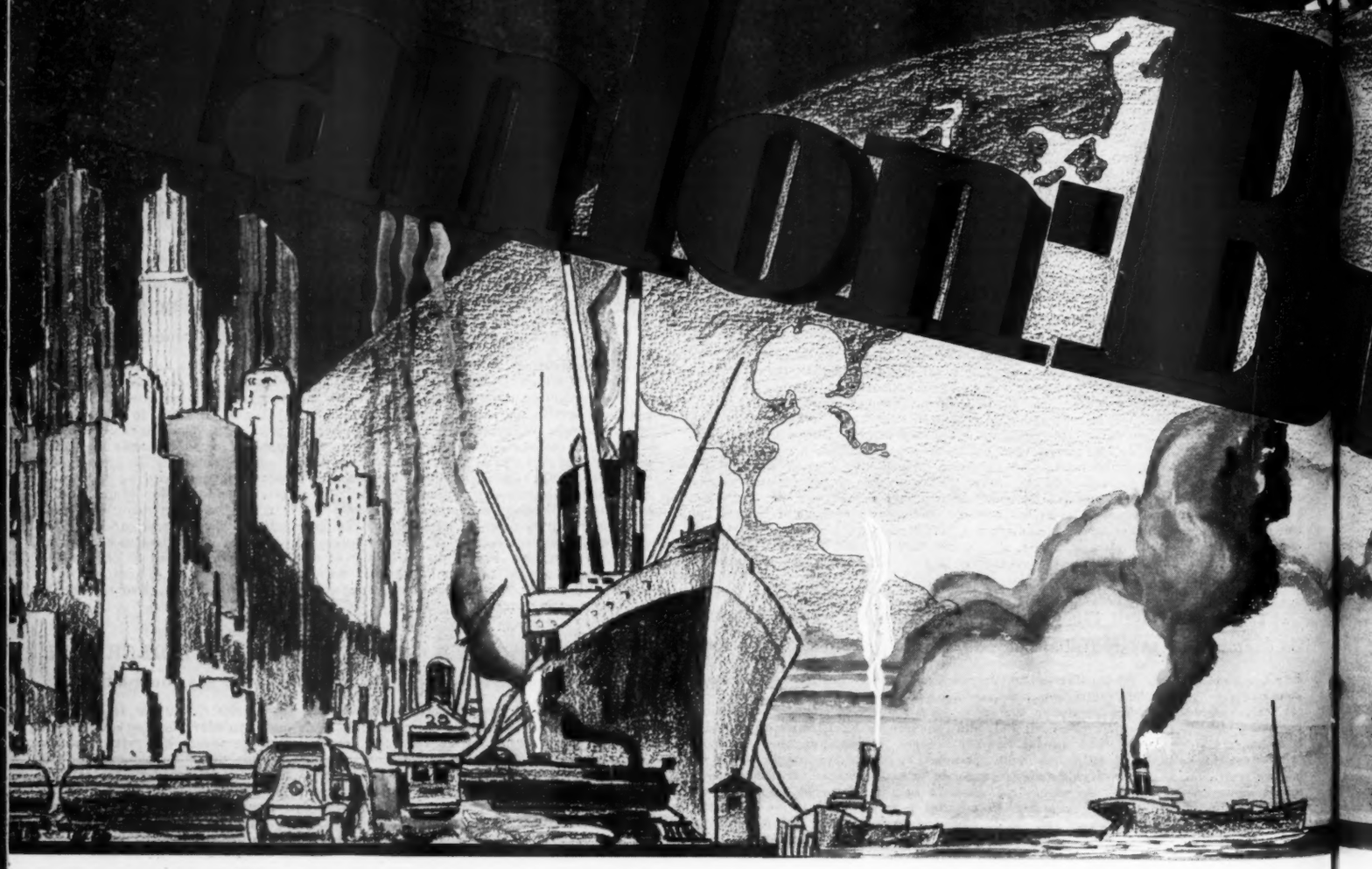
123 Harrison Street, San Francisco, Calif.

811 Sterling Building, Houston, Texas

Mid-Continent Distributors: Houston Oil Field Material Co., Houston, Texas
Webster Engineering Company, Tulsa, Oklahoma

Export Representatives: Petroleum Machinery Corp., 30 Rockefeller Plaza, New York City, N. Y.

Known the WORLD OVER



NATIONAL BANK OF TULSA BUILDING
TULSA, OKLAHOMA

EXPORT TERMINALS
Goodhope, La.
Baytown, Texas
Corpus Christi, Texas

FOREIGN REPRESENTATIVE
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Cable Address—STAVOLENE, Tulsa, U. S. A.

More than a Quarter of a Century experience in producing and distributing Natural Gasoline for blending with all types of refinery and crude stocks, is available to you in helping to solve your Motor Fuel specification problems.

Cargoes, part cargoes or tank car shipments in a wide range of volatility specifications and high octane ratings, ready for delivery at our Terminals at Goodhope, La., and Houston (Baytown) or Corpus Christi, Texas. If you have blending problems Talk "Natural" with Hanlon-Buchanan, Inc.

PIONEER NATURAL

OVER A QUARTER
IN THE NATURAL

STA-VOL-ENE

STABILITY ◆ VOLATILITY ◆ ENERGY

Más de un cuarto de siglo de experiencia en la producción y la distribución de gasolina natural, para la dosificación o mezcla con toda clase de producto crudo o refinado, se halla a su disposición, para ayudarle a resolver sus problemas relativos a las características de sus combustibles para motores.

En nuestros puntos terminales en Goodhope, La., en Houston y en Corpus Christi, Texas, tenemos cargamentos completos, o parciales, o cargamentos en vagones tanques, de gasolinas naturales en una amplia elección de índices de volatilidad y de gran grado octánico, listos para immediatas entregas. Si Ud. tiene problemas de dosificación que resolver, póngase en seguida en communicación con la Hanlon-Buchanan, Inc.

Plus d'un quart de siècle d'expérience dans la production et la distribution de l'essence naturelle, pour le dosage avec tous genres d'huiles brutes et de raffineries, est à votre disposition pour vous aider à résoudre vos problèmes relatifs aux caractéristiques de vos carburants à moteur.

Nous avons à nos points terminus de Goodhope, La., et de Houston ou Corpus Christi, Texas, des cargaisons complètes, des cargaisons partielles ou des lots de wagon-citerne, offrant un vaste choix d'indices de volatilité et de coefficients d'octane supérieur, tout prêts a être livrés. Si vous avez des problèmes de dosage à résoudre, discutez la question "essence naturelle" avec Hanlon-Buchanan, Inc.

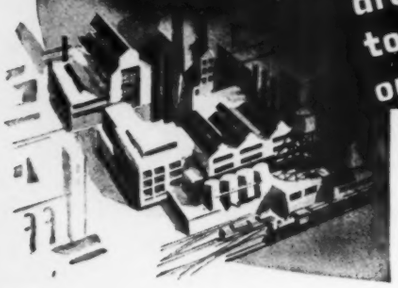
OF A CENTURY
GASOLINE INDUSTRY

GASOLINE MANUFACTURER

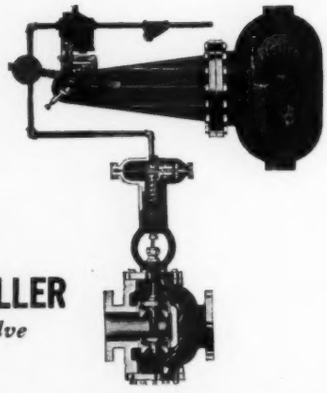
FISHER

AUTOMATIC CONTROLLERS

are individually built to meet your exact operating conditions



INVESTIGATE THESE TWO OUTSTANDING AUTOMATIC CONTROLLERS



Pilot Operated
LIQUID LEVEL CONTROLLER
With Diaphragm Motor Valve
Type No. 235-C

Controls and maintains a constant level in tanks, receiver chambers, hot wells, fractionating towers and separators. Also controls steam to pumps.

Equipped with a full-throttling auxiliary pilot valve which allows the use of a diaphragm motor valve in a remote position from the float cage installation. For all pressures.

Cages are installed on outside of liquid container by means of equalizing, pipe connections at top and bottom of float cage. All parts may be inspected without shutting down the process or tower on which the controller is installed.

Contrôle et maintient un niveau constant dans les réservoirs, chambres collectrices, puits chauds, tours de fractionnement et séparateurs. Contrôle aussi la vapeur allant aux pompes.

Equipé avec une soupape pilote auxiliaire à pleine charge qui permet l'emploi d'une soupape motrice à diaphragme située à distance de l'installation de la cage à flotteur. Pour toutes pressions.

Les cages s'installent à l'extérieur du récipient à liquide au moyen de raccords de tuyau équilibreurs en haut et en bas de la cage à flotteur. On peut en inspecter tous les organes sans arrêter le procédé ou la tour où le contrôleur est installé.

Gobierna y mantiene un nivel constante en los tanques o depósitos, cámaras colectoras, pozos calientes, torres de fraccionamiento y separadores. Gobierna también el vapor que va a las bombas.

Provisto de una válvula piloto auxiliar de carga completa, que permite el empleo de una válvula motríz de diafragma colocada a distancia de la instalación de la jaula del flotador. Para todas las presiones.

Las jaulas se instalan en el exterior del recipiente de líquido, por medio de conexiones de tubo de compensación arriba y abajo de la jaula del flotador. Se pueden inspeccionar todas las piezas, sin parar el procedimiento o la torre en que está instalado el regulador.

Wizard
PRESSURE CONTROLLER
Type No. 4257-G

For either pressure reducing or pressure relief service; suitable for steam, air, gas, water and all other fluids.

Engineers regard this pilot regulator as the most accurate, economical and friction-free unit in pressure regulation equipment. It utilizes the most modern adaptation of the Bourdon tube principle as the pilot valve.

Furnished with pilot mounted on diaphragm valve as shown or with pilot for panel board mounting. Sizes: ½" to 16" and for all pressures from 5 to 500 lbs.

Soit pour service de réduction de pression, soit pour décompression; approprié à la vapeur, l'air, le gaz, l'eau et tous autres fluides.

Les ingénieurs considèrent ce régulateur pilote comme l'idéal en précision, économie et absence de friction en matière de contrôle de pression. Il applique l'adaptation la plus moderne du principe du tube Bourdon à la soupape pilote.

Fourni avec pilote monté sur soupape à diaphragme comme sur figure ou avec pilote pour montage sur tableau. Grandeurs: ½ pouce à 16 pouces et pour toutes les pressions de 5 à 500 lbs.

Para servicio de reducción de presión o para servicio de descompresión; adecuado a vapor, aire, gas, agua y otros líquidos.

Los ingenieros consideran este regulador piloto como lo ideal en precisión, economía y ausencia de fricción en materia de gobierno de presión. Utiliza la más moderna adaptación del principio del tubo Bourdon en la válvula piloto.

Se suministra con piloto montado en la válvula de diafragma, como en el grabado, o con piloto de instalación en el tablero. Tamaños: ½" a 16", para toda presión de 5 a 500 libras.

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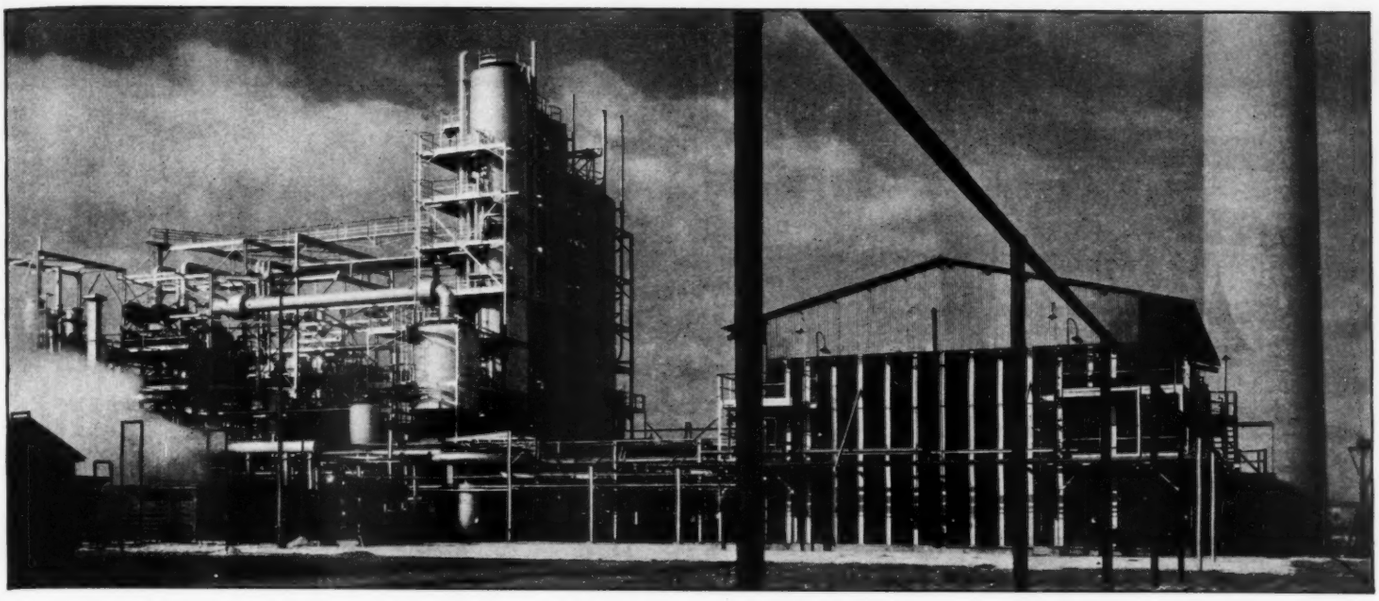
LIQUID LEVEL CONTROLLERS ★ PILOT OPERATED REGULATORS ★ GAS REGULATORS ★ PRESSURE REGULATORS ★ PUMP GOVERNORS ★ FLOAT VALVES ★ STEAM TRAPS ★ STRAINERS ★ REFINERY and OIL FIELD AUTOMATIC CONTROLS of SPECIAL DESIGN

FISHER AUTOMATIC CONTROL

Fisher Sales Engineers in Every Principal City

FISHER GOVERNOR COMPANY, MARSHALLTOWN, IOWA



Solvent refining unit for manufacture of lubricating oils. Located in Beaumont, Tex., refinery of the Magnolia Petroleum Co.
Groupe de raffinage de solvants pour la fabrication des huiles de graissage. Dans la raffinerie de Beaumont, Tex., de la Magnolia Petroleum Co.
Instalacion de refineria por solvente, para la preparacion de aceites lubricantes, ubicada en Beaumont, Tex., E.U.A., en la propiedad de la refineria general de la Magnolia Petroleum Co.

of the greater portion of gasoline. The demand for low flash-point furnace oils has tended to defeat the general trend toward closer fractionation. When the fractionation of the furnace oil has been more effective than desired it has been common practice to blend back some lighter fractions to reduce the flash-point of the blend. The latter procedure was not considered advisable except where a careful selection of the blending material could be made.

A blending material as nearly like the base stock is preferred. In the larger refineries, substantial volumes of cracked furnace oils have been made. Where it has been customary to redistill the pressure distillate, the bottoms or heavy ends have been recovered as furnace oil.

Chemical treatment, using the doctor solution only, has been generally applied to furnace oils. Those which were made directly from the crude or during cracking were usually treated with doctor solution while those which were recovered as treated pressure distillate bottoms were generally given but a caustic wash.

HEAVY FUELS

It is difficult to make a sharp division between light and heavy fuel oils but in this discussion the residuum fuels are classed as "heavy." These fuels are largely the residuum from cracking operations and naturally have a low cold test, which characteristic makes them more acceptable.

Cracked fuels usually contain relatively high quantities of solid material, namely, finely divided coke. While this characteristic is not desirable, it has not limited the use of these fuels in industry and as bunker oils. The better design of cracking furnace to minimize the production of coke has greatly improved these fuels.

LUBRICANTS

The principal improvements in the technique of manufacturing motor oils has been the general

(Continued in Third Column)

On donne la préférence à un produit de dosage d'une composition aussi voisine que possible que celle du produit de base. Dans les grandes raffineries, on a fait des quantités importantes d'huiles combustibles par crackage. Où il était d'usage de soumettre à une nouvelle distillation le distillé sous pression, on a recueilli les fonds ou fractions lourdes comme huile combustible.

On a en général appliqué aux huiles combustibles un traitement chimique n'employant que la solution au plombite. Celles qui avaient été obtenu directement du pétrole brut ou durant le cracking étaient en général traitées par la solution au plombite, alors que celles qui avaient été récupérées comme fonds traités de distillé sous pression n'étaient soumises qu'à un lavage caustique.

CARBURANTS LOURDS

Il est difficile de fixer une ligne de démarcation exacte entre les huiles carburantes légères et les lourdes, mais dans la présente discussion les carburants résiduaires sont classés comme "lourds." Ces carburants sont en grande partie le résidu des opérations de cracking et ont bien entendu un point de congélation bas, caractéristique qui les rend plus acceptable.

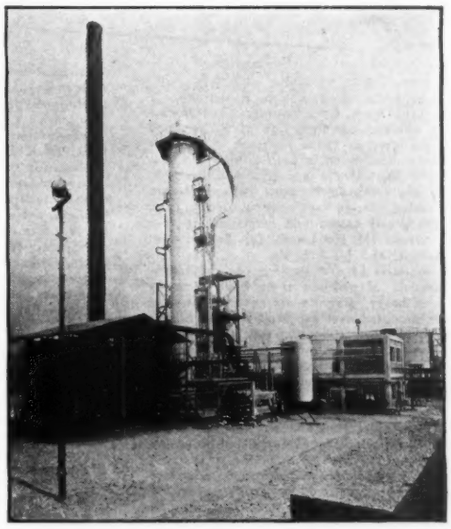
Les carburants crackés contiennent des quantités relativement fortes de matière solide, à savoir du coke finement divisé. Bien que cette caractéristique ne soit pas désirable, l'emploi de ces carburants n'en a pas été limité de ce fait à l'industrie et comme huiles de soute. La qualité de ces carburants a d'ailleurs été nettement améliorée l'emploi de fours de cracking mieux conçus aux fins de réduire au minimum la formation de coke.

LUBRIFIANTS

Les principaux progrès réalisés dans la technique de la fabrication des huiles de moteur ont été l'adoption générale du raffinage de solvants et du déparaffinage de solvants, ainsi que l'emploi généralisé de produits d'addition pour améliorer les constantes des huiles. A noter en particulier l'emploi croissant du furfural comme solvant. Les groupes modifiés de solvant d'anhydride sulfureux ont continué à tenir un rang relativement éminent et les installations modifiées de solvant de phénol ont traité des quantités croissantes d'huile.

L'emploi de produits d'addition dans les huiles de moteur est devenu pratique courante comme suppresseurs de point de congélation, comme inhibiteurs contre la corrosion des paliers, pour l'amélioration de l'indice de viscosité, outre un certain emploi de matière colorante aux fins de produire une "efflorescence" artificielle.

de motor se ha hecho práctica corriente como supresores de punto de congelación, como inhibidores contra la corrosión de cojinetes, para el mejoramiento del índice de viscosidad, además del empleo de un material colorante, para producir una "eflorescencia" artificial.



Distillation unit with heater and power house at A.G.I.P.'s refinery in Venice, Italy

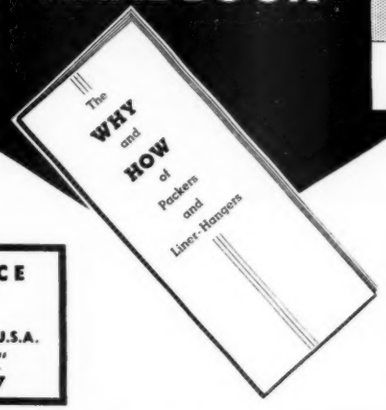
adoption of solvent refining and solvent dewaxing and the extended use of additives to improve specific characteristics of the oils. The increased use of furfural as a solvent has been especially noticeable. Modified sulfur dioxide solvent units have continued to hold a relatively strong position and modified phenol solvent plants have processed increasing quantities of oil.

The use of additives in motor oils has become common as pour-point suppressors, inhibitors against bearing corrosion, for the improvement of the viscosity index, and some use of color material to produce an artificial "bloom" has been made.

WHY...
Use Packers?
BECAUSE...
they give you better control of your well conditions, and lower your production costs.
WHY...
Use Lane-Wells "Multiple Ring" Packers?
BECAUSE...
their construction assures you of
(1) An absolute seal.
(2) Positive control by operator.
(3) Ease of removal... This point is especially important, as all operators know. The series of Lane-Wells packing rings, made of multiple layers of graphite-impregnated fabric moulded over a rubber core, and alternating with metal expansion rings, positively will not vulcanize or stick to the casing—even under the most severe pressure and temperature conditions... That is why we recommend the "ring" type wherever possible, though we do make packers (and liner hangers) with packing elements of lead and plain rubber for special cases...
Another point for the "ring" type is...
(4) Economy... The entire tool can be salvaged (even after setting for years), cleaned up, packing element replaced and packer made ready for use again right on the job without sending it to a shop.
"Haven't Stuck Yet"
[3]
WHY...
Use Lane-Wells "Multiple Ring" Liner Hangers?
BECAUSE...
they employ the same basic principles that have made Lane-Wells Multiple-Ring Packers a great success—the same series of packing rings made of multiple layers of graphite-impregnated fabric moulded over and around a one-piece rubber core, giving positive insurance against vulcanizing and sticking to casing... If anything, this assurance of easy removal when desired is of greater importance in liner hangers than in packers, since the liner hanger usually remains in the well for a longer period of time...
The same points of economy in 100% salvage value and simplicity of renewing packing element, mentioned in connection with our Ring Packers, apply with equal force to Lane-Wells Liner Hangers.
Liner Setting and Re-Setting Tool, and Liner Setter Adapter
We furnish a liner setting tool which allows the safe use of threaded joint as a releasing connection, by providing a positive means of removing the weight of the setting string from the threads in connection with a rotary bump or jar.
For Full Description See Our Bulletin No. 1, Page 9
We also furnish a liner setter adapter, similar in design to the top collar of our liner hanger, and with a variety of uses. Adapters or top liner hanger collars, also available for running Lane-Wells liner hangers on other types of setting tools.
For Full Description See Our Bulletin No. 1, Page 10
"Haven't Stuck Yet"
[11]

WHY and HOW of PACKERS and LINER HANGERS

SEND FOR this CONCISE HANDBOOK



The Lane-Wells Co., Engineers & Manufacturers, offers a complete line of Packers and Liner Hangers in types to meet almost any condition encountered in both drilling and producing wells, where a packer should be used.

They are furnished to pack between tubing and casing, casing and casing, tubing and formation, and casing and formation, in four basic types: (1) Hook-wall; (2) Bottom-hole; (3) Anchor; and (4) Rat-hole.

The exclusive Lane-Wells Ring Packing Assembly consists of multiple rings built of many layers of heavy, graphite-impregnated, bias-cut canvas, moulded over and around a live rubber core, these rings alternating with metal expansion rings. This assembly eliminates all danger of vulcanizing to the casing, and assures a positive seal. . . . Other sleeves, or assemblies, of rubber, canvas, lead, belting or other materials are furnished to meet individual requirements. . . . Plain Liner Hangers, also, are furnished.

The Lane-Wells Liner Setting and Resetting Tool allows the use of a threaded joint as a releasable connection providing adequate strength to insure complete safety in setting the heaviest liner. The tool is packed, assuring positive circulation into the liner, and is threaded to permit the use of tubing below it for washing purposes.

The Lane-Wells Co. is also the developer and operator of the Lane-Wells Gun Perforator.

La Lane-Wells Co., ingenieros y fabricantes, ofrecen un surtido completo de empacadores y sujetadores de forros en tipos para satisfacer casi todas las condiciones que se encuentran en la producción y explotación de pozos petrolíferos, donde hay necesidad de emplear semejantes equipos.

Estos productos se suministran para empacar entre la tubería y la cubierta, entre cubierta y cubierta, entre tubería y formación y entre cubierta y formación, ofreciéndose en cuatro tipos principales: (1) pared de gancho, (2) hoyo de fondo, (3) ancla y (4) agujero de ratón.

El exclusivo grupo de empaquetadura anular Lane-Wells consta de anillos múltiples construídos de varias capas de lona gruesa grafitada y cortada al sesgo, moldeada alrededor de un núcleo de caucho elástico. Estos anillos se alternan con anillos metálicos de expansión. El grupo evita todo peligro de vulcanización a la cubierta y asegura un cierre positivo. Otros grupos o manguitos de caucho, lona, plomo, correaje y otros materiales, se suministran para satisfacer requisitos individuales. También se suministran sujetadores sencillos.

La herramienta de ajuste y reajuste Lane-Wells de canalización permite el empleo de una unión roscada, como una conexión desprendible, que provee adecuada firmeza para asegurar completa seguridad en la instalación de los forros más pesados. La herramienta está bien protegida por empaquetadura, asegurando positiva circulación en la canalización, y está roscada para permitir el uso de una tubería debajo de ella para el servicio de lavado.

La Lane-Wells Co. ha también y puesto en operación el perforador de pistola Lane-Wells.

EXPORT SERVICE
John H. Baird
General Manager
420 Lexington Ave., New York, U.S.A.
Cable Address "WELLSLANE"
Telephone MOhawk 4-4957

La Lane-Wells Co., Ingénieurs et Fabricants, offre un assortiment complet de garnitures et d'attache-canalisations, comprenant une variété suffisante de modèles pour faire face à la quasi-totalité des conditions d'emploi, tant pour le forage proprement dit que pour la mise en exploitation des puits pétrolifères, où il convient de faire usage d'une garniture.

Ces garnitures sont fournies pour garnir entre tubage et revêtement, revêtement et revêtement, tubage et gisement, revêtement et gisement, en quatre types de base : (1) Accroche-paroi; (2) Trou de fond: (3) Ancre: et (4) Trou de rat.

L'ensemble exclusif Lane-Wells de garniture à anneaux consiste d'anneaux multiples constitués par de nombreuses couches superposées de fort canevas, imprégné de graphite et coupé en biais, ce canevas étant moulé sur et autour d'un noyau de caoutchouc natif; ces anneaux sont alternés avec des anneaux métalliques à expansion. Cet ensemble supprime tout danger de vulcanisation de revêtement, et assure un joint d'une étanchéité positive. . . . Il est fourni aussi d'autres manches ou ensembles, en caoutchouc, canevas, plomb, courroie ou autres substances, afin de donner aux exigencies individuelles. . .

L'Outil Lane-Wells d'Ajustage et de Réajustage de canalisation permet l'emploi d'un joint fileté comme raccord détachable, ce qui assure une force suffisante pour donner toute la sécurité voulue à la mise en place de la canalisation la plus lourde. Cet outil est entouré de garniture, ce qui assure une circulation positive dans la canalisation, et il est fileté afin de permettre l'emploi de tubage au-dessous de son niveau, pour opération de lavage.

La Lane-Wells Co. a aussi créé et mis en service le Perforateur à Pistolet Lane-Wells.

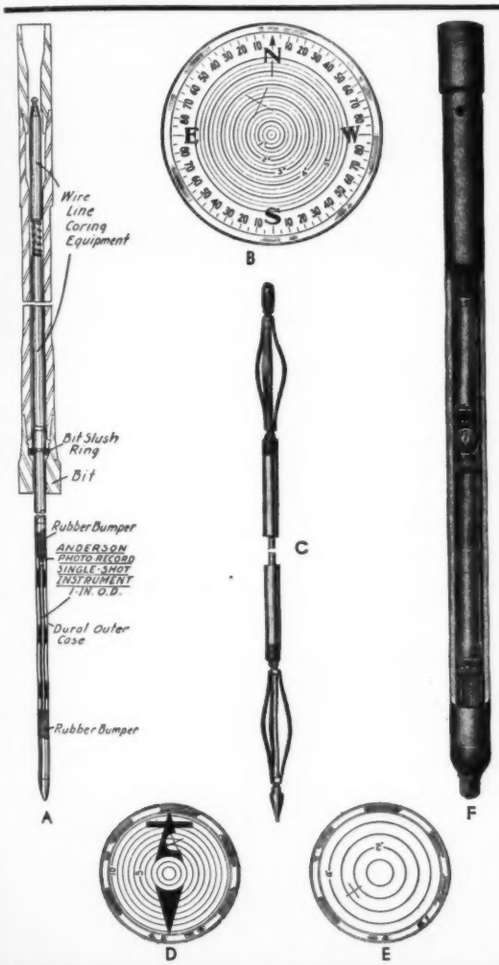
Tomorrow's Tools Today

LANE-WELLS SERVICES AND PRODUCTS INCLUDE:
GUN-PERFORATORS
OIL WELL SURVEYS
DIRECTION CONTROL OF DRILLING WELLS
PACKERS—LINER HANGERS
BRIDGING PLUGS
Single-Shot Survey Instruments
IN CALIFORNIA
Lewis Knuckle Joints
Kinzbach Whipstocks and Mills

Technical Oil

who serve best . . .

To render a more comprehensive service to the oil industry THE LANE-WELLS CO. has purchased Alexander Anderson Inc. Since 1924 the Anderson organization has built up an enviable reputation for accurate oil well survey and directional drilling control facilities. The personnel tools instruments and laboratories of Alexander Anderson Inc. will continue their consistently reliable work under Lane-Wells engineering direction. Such engineering ability and technical knowledge as may be possessed by THE LANE-WELLS CO. will be devoted to furthering this service and developing any new or improved processes not already covered under Anderson patents Bill Lane and Walt Wells reiterate their pledge to give the drilling and production divisions of the oil industry the best service at reasonable prices.



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Accuracy and ease of operation are provided by Anderson Instruments and Tools. The Photo-Record Single-Shot Survey Instruments measure both inclination and direction in open hole while the well is being drilled. The large size "F" (3¼" O.D.) is run on the sand line and furnishes the Record Disc "B". The smaller sizes run on piano wire or used with wire line coring equipment as shown at "A", provide the Record Disc "D" without removing drilling tools from the hole. The Photo-Record Go-Devil "C" (1¾" O.D.) gives inclination readings on Disc "E" when dropped through the drill pipe.

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See Composite Catalog and send for Complete Details

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Les instruments et les outils Anderson se signalent par la précision et l'aisance de manipulation. Les instruments prospecteurs à enregistrement photographique en une seule opération mesurent dans le puits ouvert tant l'inclinaison que la direction au cours du forage. Le fort calibre "F" (3¼ pouces D.E.) est descendu par la conduite à sable et fournit le disque enregistreur "B". Les plus petits calibres, descendus par fil de piano ou employé avec équipement de carottage à câble métallique comme représenté en "A", fournit le disque enregistreur "D" sans devoir sortir les outils de forage du puits. L'enregistrement photographique "C" dit "Go-Devil" (1¾ pouce D.E.) donne les indications d'inclinaison sur le disque "E" lorsqu'on le fait descendre dans le tuyau de forage.

Nous offrons aussi une sèrie complète d'outils de forage en direction.

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Instrumentos y Herramientas Para Reconocimientos Subterraneos y Perforacion Direccional

Los instrumentos y las herramientas Anderson se caracterizan por la precisión y la facilidad de su manipulación. Los instrumentos de reconocimiento de registro fotográfico, de tipo de una sola operación, miden en los pozos abiertos, tanto la inclinación como la dirección durante la perforación. El tamaño grande (de 3¼" de diámetro exterior) se hace descender por el conducto de arena y suministra el disco registrador "B". Los de tamaño pequeño se hacen descender con alambre de piano o se emplea con el equipo de sacar muestra accionado por cable metálico, como se representa en A, y suministra el disco registrador "D", sin necesidad de quitar los útiles de perforación del pozo. El registro fotográfico, llamado "Go-Devil," señalado por la "C" (de 1¾" de diámetro exterior) da las indicaciones de inclinación sobre el disco "E", mientras va descendiendo por el tubo de perforación.

Ofrecemos también un surtido completo de herramientas de perforación direccional.

Sírvase ver el catálogo combinado y pedirnos detailles completos.

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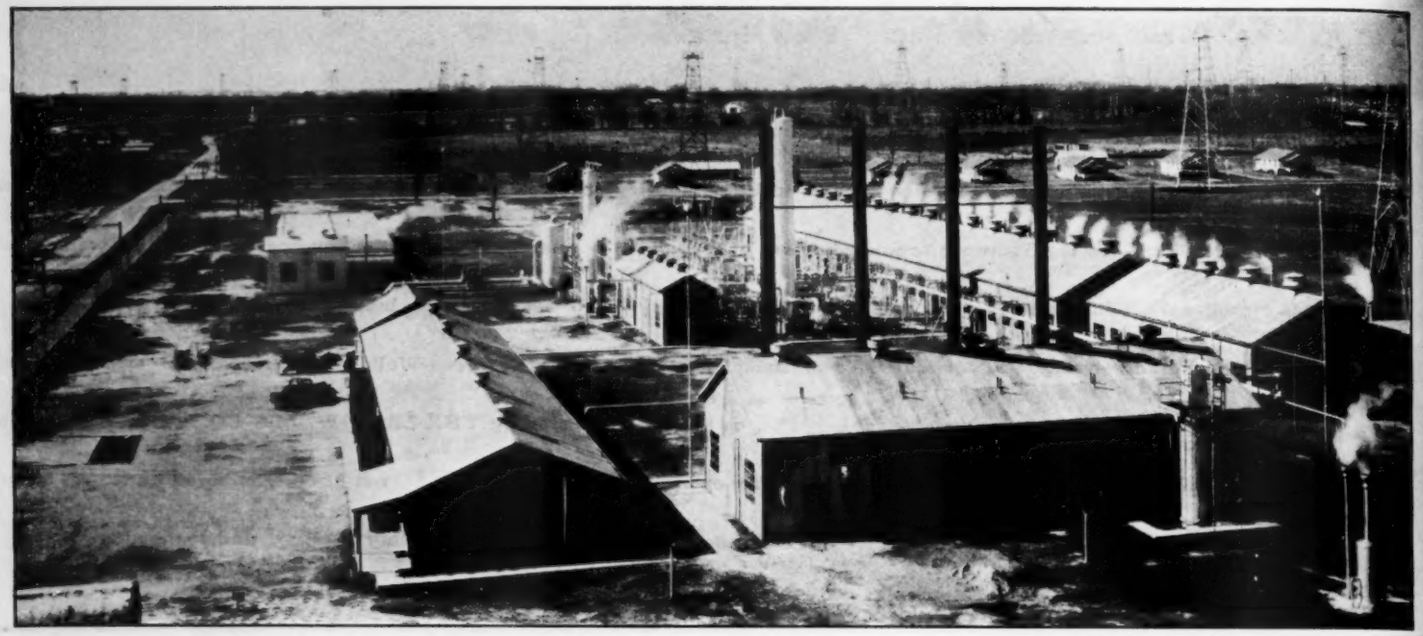

Typical compressor-type natural gasoline plant *Installation typique d'essence naturelle du type a compresseur*
Instalacion de gasolina natural de tipo de compresor

Natural Gasoline

Organized originally as a separate division of the petroleum industry the personnel and equipment involved in the recovery of natural gasoline from natural hydrocarbon gases have since become quite dependent upon other divisions. In the immediate past, the natural gasoline industry has operated somewhat as an adjunct of the oil production division. The purpose of the natural gasoline plant was to recover vapors from the gas which accompanied the oil production. The production of the oil was essential and this was promoted all possible. Under this procedure natural gasoline plants were built whenever and wherever oil pools were developed and little consideration was given to the economics of building gasoline plants beyond the objective that each unit built would recover the greatest volume of liquid for a given investment. Under this procedure it was common for each oil producing company to build its own natural gasoline plant to recover the vapors from its own crude oil. This was conducive to building many small units, each of which called for a relatively small expenditure of money but the total expenditures for all plants in any given field was usually relatively large. The product of these plants was readily absorbed.

NEW CONDITIONS

At the present time the industry is influenced in its operation by an entirely different set of conditions. While the objective of natural gasoline plant operation is to recover vapors from natural gas it also becomes essential for the natural gasoline plant to turn out a product that fits into a more exacting motor fuel market. Natural gasoline is no longer readily absorbed. Instead, it must be marketed as any other petroleum product. It must compete with other petroleum products.

It is doing this successfully, however, and now represents 7.3 per cent of the total volume of motor fuel made in the United States. In the world, the relationship is probably less favorable to natural gasoline. In the United States, where better than

(Continued on Page 273)

Essence Naturele

Organisés à l'origine en division séparée de l'industrie du pétrole, le personnel et le matériel mis en jeu dans l'extraction de l'essence naturelle des gaz hydrocarburés naturels sont devenus depuis intimement liés aux autres divisions de la branche. Dans le passé immédiat, l'industrie de l'essence naturelle a été conduite un peu comme un accessoire de la division de la production du pétrole. Le but de l'installation d'essence naturelle était de récupérer les vapeurs du gaz qui accompagnait la production du pétrole. Ce qui était essentiel était la production du pétrole et on faisait tout pour la favoriser. Dans ce sens, on ne construisait des installations d'essence naturelle que dans les cas où des groupements pétroliers avaient été constitués, et quant à l'aspect économique de la construction de ces installations d'essence on ne voyait pas plus loin que l'objectif d'après lequel chaque groupe construit récupèrerait le plus grand volume possible de liquide pour un certain capital engagé. Selon cette méthode il était courant que chaque compagnie productrice de pétrole construisît sa propre installation d'essence naturelle pour extraire les vapeurs de son propre pétrole brut. Ceci avait conduit à la construction de nombreuses petites installations, dont chacune ne demandait qu'une mise de fonds relativement faible, mais le total des frais pour toutes les installations dans tout champ donné était en général assez impressionnant. Le produit de ces installations était absorbé d'emblée.

NOUVELLES CONDITIONS

A l'heure actuelle l'industrie est influencée dans sa marche par un ensemble de conditions entièrement différentes. Bien que le but de l'installation d'essence naturelle soit bien de récupérer les vapeurs du gaz naturel, il devient aussi essentiel que l'installation d'essence naturelle obtienne un produit adapté aux plus grandes exigences du marché actuel en carburants moteurs. L'essence naturelle ne se vend plus aussi facilement. Il faut en étudier la vente tout comme celle de tout autre produit pétrolier. Il lui faut soutenir la concurrence des autres produits pétroliers.

C'est avec succès qu'elle le fait, toutefois, et elle représente à l'heure actuelle 7,3 pour cent du volume total de carburant moteur fabriqué aux Etats-Unis. Pour l'ensemble du monde, le pourcentage est probablement moins favorable que ce chiffre à l'essence naturelle. Aux Etats-Unis, d'où vient plus de 80 pour cent de la production mondiale d'essence naturelle, l'augmentation de la produc-

(Continué sur Page 273)

Gasolina Natural

Organizados al principio como una división separada de la industria del petróleo, el personal y el material comprendidos en la extracción de la gasolina natural de los gases hidrocarburados naturales han quedado después íntimamente unidos a los otros departamentos de la industria. En el pasado inmediato, la industria de la gasolina natural fué conducida como si hubiera sido un accesorio de la producción de petróleo. El fin de la instalación de gasolina natural era recuperar los vapores del gas, que acompañaban a la producción de petróleo. Lo esencial entonces era la producción de petróleo y se hacía todo lo que se podía por favocerla. Bajo este procedimiento, no se construían instalaciones de gasolina natural sino en los casos en que se habían constituído agrupaciones petroleras, y poco estudio se daba a los aspectos económicos de la construcción de instalaciones de gasolina, que no fuera el de que cada instalación construída recuperara la mayor cantidad de líquido para cierto capital invertido en el trabajo. Según este método, era práctica corriente que cada compañía de petróleo construyese su propia instalación de gasolina natural para la extracción de los vapores de su propio petróleo bruto. Esto naturalmente condujo a la construcción de numerosas instalaciones pequeñas, cara una de las cuales demandaba una inversión de fondos relativamente baja, pero que en su totalidad, en un campo dado, representaban un gasto muy considerable. El producto de estas instalaciones se absorbía en seguida.

NUEVAS CONDICIONES

A la hora actual, la industria está influenciada en su desarrollo por un conjunto de condiciones enteramente diferentes. Aunque el fin principal de la instalación de gasolina natural es recuperar los vapores del gas natural, se hace también esencial que la instalación de gasolina natural produzca un producto adaptado a los requisitios más exigentes del mercado actual de combustibles de motor. La gasolina natural no se vende más con la misma facilidad que en años pasados. Es necesario estudiar su venta, como la de todo otro producto del petróleo. Tiene que venderse en competencia contra otros productos petrolíferos.

Esto lo está haciendo con éxito, y representa ella actualmente el 7,3% de la cantidad total de combustible de motor fabricado en los Estados Unidos de América. Sobre una base mundial, el porcentaje es probablemente menos favorable para la gasolina natural. En los Estados Unidos de América, donde se origina más del 80 por ciento

(Continué en Página 273)

IN ANY TONGUE . . .

IN ANY LAND . .

THE NAME

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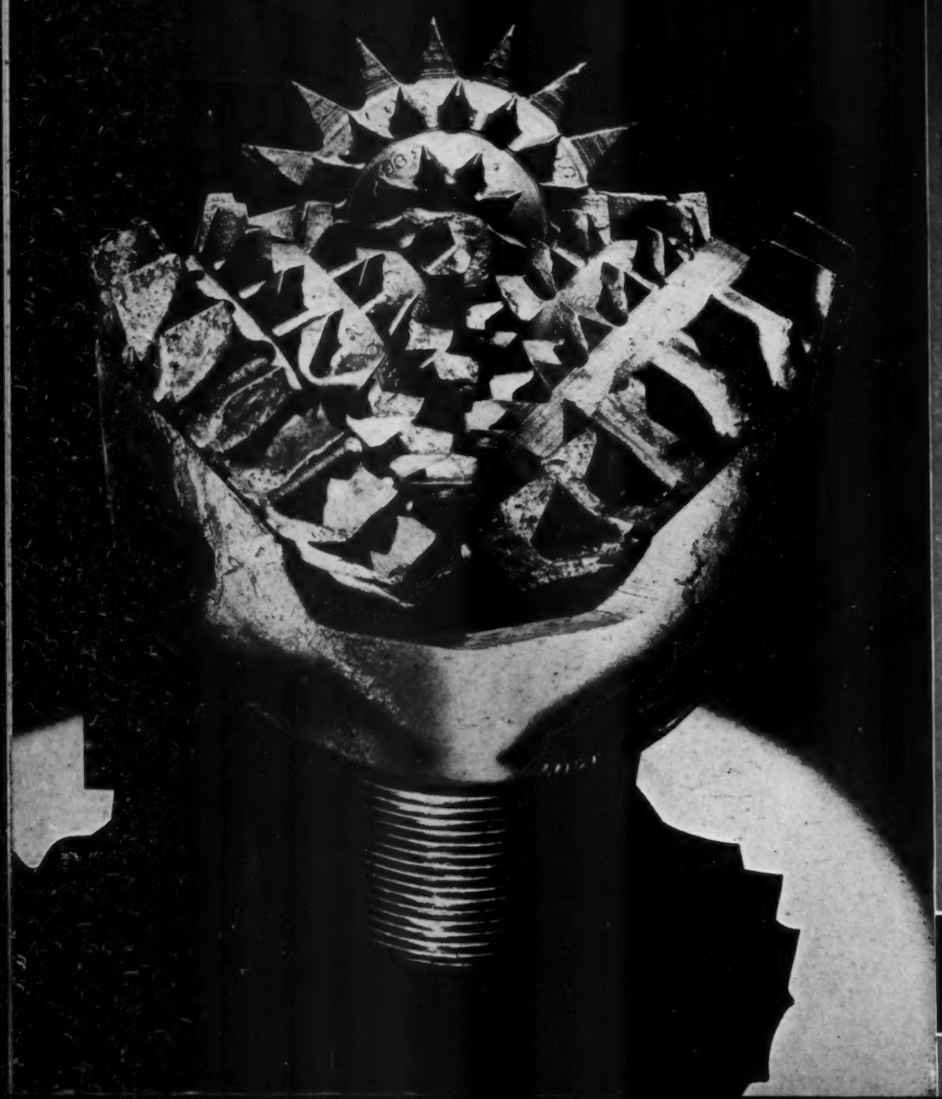
DRILLING & CORING

Supremacy

The CHAMPION Hole Maker

Hughes ROCK BIT



Years of experience in laboratory and field have proven the necessity for an "Individual" Rock Bit—for every Rock Bit formation.

Formations in various fields—in different countries—are different. They vary so in **drillability** as to require different types of Rock Bits if maximum economy of time and bits is to be obtained.

Hughes Tool Company meets today's demands of the drilling industry with "Tailor-Made" Rock Bits—each Bit especially designed to best meet a particular drilling requirement.

While any Hughes Rock Bit will make fair footage in any Rock Bit formation—maximum results may be obtained by using the Hughes Rock Bit especially designed for the formation encountered.

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The CHAMPION

Core Taker

Coring is essential to modern drilling practices.

The Hughes Core Bit has proven outstanding in delivering to the derrick floor large, uncontaminated cores.

Because of proper design and heat-treatment of the alloy steel parts, this bit is safe, economical and convenient in operation. Cutter shafts and washers are made an integral part of the crown.

Following are some of the major features of the Hughes Core Bit:

1. Large diameter core recovered.
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7. Ease of dressing and handling.
8. Simplicity and long life of parts.
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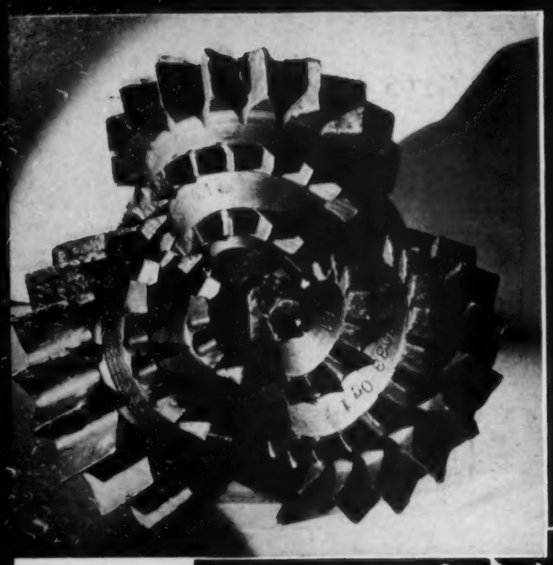

The Industry's Answer to Today's Drilling Problems..

HUGHES Tailor-Made ROCK BITS

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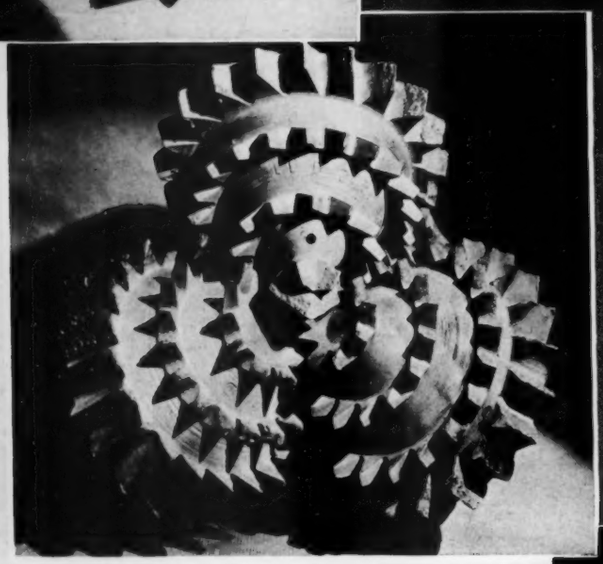

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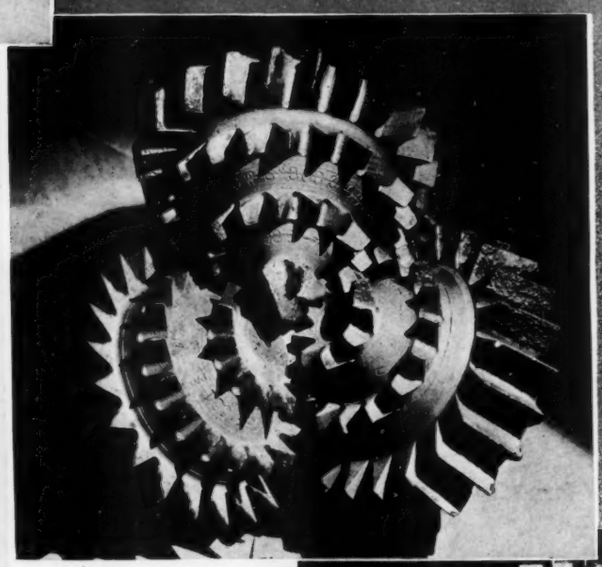

3

1. "OS" SERIES—Unconsolidated shales, sands, chalk, salt, anhydrite and gypsum.
2. "D" SERIES—Lime rock and sandy lime. (Known as the "Lime Special.")
3. "W" SERIES—Dolomite, dolomitic lime rocks, slate and hard shales.
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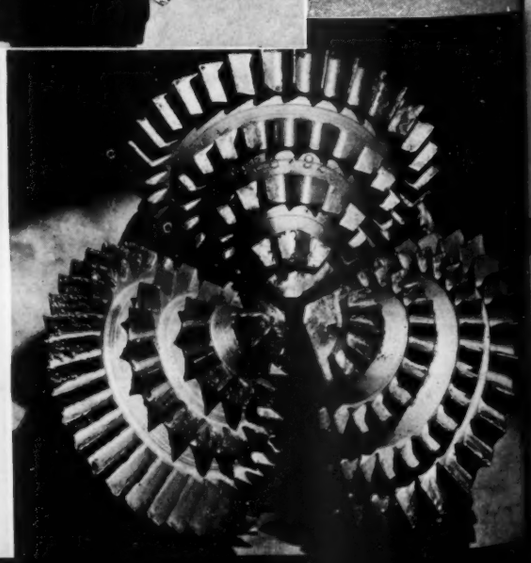
Write for Hughes Tool Company catalog — giving complete information on Hughes Specialized Oil Industry Tools.



4

80 per cent of the world's production of natural gasoline originates the increase in production so far this year is 17 per cent ahead of the same period last year. This compares with an increase of 11 per cent in the total motor fuel output for the same period.

Recognizing the changing horizons for the natural gasoline industry and appreciating its ability to make the most of the subordinate position it has held in the past, conditions are now tending to call for major revisions in the work and scope of the industry.

POLYMERIZATION

This newer conception of the work of the natural gasoline industry is being brought about through the commercial application of polymerization whereby the vapor contained in natural gas is converted into a finished motor fuel by synthesis in contrast with simply recovering the natural vapor contained in the gas. The change may be compared with the change refining operations went through with the advent of cracking. Not many years ago gasoline was recovered from crude oil by simple distillation; now most of it is manufactured from crude oil fractions by cracking, reforming, or polymerization. And with this change has come a decided improvement in quality.

Obviously, a change so sweeping as this can not come in the period of one year or a few years but at least two natural gasoline plants are completed in which the polymerization of the butane, propanes and the constituents of natural gasoline are being converted to high antiknock motor fuel fractions.

TO MAKE FINISHED MOTOR OIL

One plant, most recently built, recovers as a liquid everything above methane and ethane and uses this material as charging stock for a polymerization unit. No natural gasoline is expected to be produced in the plant, but, of course, relatively slight modification in the fractionating and stabilizing equipment would permit its recovery should polymerization to motor fuel prove uneconomical.

Thus, the natural gasoline division of the petroleum industry is faced with having to revamp its operations in certain districts at least, to prepare for introducing polymerization. Polymerization units are essentially cracking units which are so controlled thermally or by catalysts to produce hydrocarbons of high antiknock value. The unit cost of the equipment is high compared with ordi-

(Continued on Page 277)

tion jusqu'ici cette année est de 17 pour cent par rapport à la même période de l'an dernier. Ce chiffre est intéressant, surtout si on le compare avec l'augmentation de la production totale de carburants moteurs pour la même période qui s'est chiffrée à 11 pour cent.

Reconnaissant les horizons différents qui s'offrent à l'industrie de l'essence naturelle et sa faculté de tirer un parti maximum de la position subordonnée qu'elle a tenue dans le passé, les conditions actuelles tendent à demander des modifications profondes du travail et du domaine propres à l'industrie.

POLIMERISATION

Cette toute nouvelle conception de la conduite de l'industrie de l'essence naturelle est le résultat de l'application commerciale de la polimérisation par le moyen de laquelle les vapeurs contenues dans le gaz naturel sont converties en un carburant moteur fini par synthèse au lieu de se borner simplement à récupérer les vapeurs naturelles que contient le gaz. On peut comparer ce changement à celui que les opérations de raffinage ont subi lors de l'apparition du cracking. Il n'y a pas encore tant d'années l'essence était obtenue du pétrole brut par distillation simple; à l'heure actuelle la majorité en est fabriquée à partir de fractions de pétrole brut par le cracking, la réformation ou la polimérisation. Et à la suite de ce changement il y a eu une amélioration marquée de la qualité.

Il est évident qu'un changement aussi décisif que cela ne peut pas avoir lieu dans le court espace d'une année ou même de quelques années, mais on compte déjà au moins deux installations d'essence naturelle où l'on fait la polimérisation du butane et des propanes, et où les éléments constitutifs de l'essence naturelle sont convertis en fractions de carburants moteurs à haut indice antidétonant.

FABRICATION DU CARBURANT MOTEUR FINI

Une installation, construite tout récemment, recueille sous forme liquide tout produit au-dessus du méthane et de l'éthane et emploie ce liquide comme matière de chargement dans un groupe de polimérisation. On ne cherche pas à obtenir de l'essence naturelle dans ce groupe, mais il va de soi qu'il suffirait d'une modification relativement légère au matériel de fractionnement et de stabilisation pour pouvoir en recueillir, si jamais la polimérisation à production de carburant moteur se montrait inéconomique.

Ainsi, la division de l'essence naturelle de l'industrie du pétrole doit faire face à un remaniement total de ses opérations dans certaines régions du moins, pour préparer l'introduction de la polimérisation. Les groupes de polimérisation sont essentiellement des groupes de cracking qui sont contrôlés thermiquement ou par catalyseurs de manière à produire des carbures d'hydrogène d'un haut indice antidétonant. Le coût unitaire du matériel est élevé en comparaison avec le matériel courant d'une installation d'essence maniant des volumes correspondants. Bien entendu, la valeur

(Continué sur Page 277)

de la producción mundial de gasolina natural, el aumento de la producción durante gran parte del presente año ha sido de 17 por ciento en comparación con el mismo período del año pasado. Esta cifra es interesante, sobre todo cuando se le compara con el aumento de la producción total de combustible de motor para el mismo período, la cual ha sido de 11 por ciento.

Reconociendo los horizontes diferentes que se presentan a la industria de la gasolina natural y su facultad para sacar provecho máximo de la posición subordinada que ella ha tenido en el pasado, las condiciones actuales tienden a exigir modificaciones profundas en el trabajo y alcance de la industria.

POLIMERIZACION

Esta nueva concepción de la industria de la gasolina natural es el resultado de la aplicación comercial de la polimerización, por medio de la cual, los vapores contenidos en el gas natural son convertidos en un combustible de motor, efectuándose ésto por síntesis, en lugar de recurrirse a la recuperación de los vapores naturales contenidos en el gas, para obtener este resultado. Se puede comparar este cambio con el que han experimentado las operación de rafinación con la introducción del procedimiento de cracking. Hasta hace pocos años, la gasolina se obtenía del petróleo bruto por destilación sencilla, pero actualmente, la mayor parte de ella se produce ahora de fracciones de petróleo bruto por el procedimiento de cracking, por reformación o por polimerización. Y a consecuencia de este cambio, se ha mejorado mucho la calidad de la gasolina.

Es evidente que un cambio tan importante como el presente no puede difundirse en el corto espacio de un año, ni aun en el curso de unos pocos años, pero se cuenta ya con dos instalaciones de gasolina natural, por lo menos, donde mediante la polimerización, el butano, propano y otros elementos constituyentes de la gasolina natural, se están convirtiendo en fracciones de combustible de motor de alto índice antidetonante.

FABRICACION DE COMBUSTIBLE DE MOTOR ACABADO

Una de las instalaciones de más reciente construcción recupera, bajo forma líquida, todo producto arriba del metano y del etano y emplea este líquido como material de carga en un equipo de polimerización. En esta interesante instalación no se espera obtener gasolina natural, pero fácil es comprender que con algunas leves modificaciones introducidas en el grupo de fraccionación y estabilización, se podría producir esta gasolina natural, en caso de que la polimerización de combustible de motor no resultara económica.

Se ve claramente que la división de gasolina natural de la industria del petróleo tendrá que hacer una revisión considerable de sus operaciones en ciertas regiones, por lo menos, a fin de introducir el procedimiento de la polimerización. Las instalaciones de polimerización son esencialmente instalaciones de cracking, que se controlan térmicamente o por medio de catalizadores, de manera de producir hidrocarburos de alto índice antidetonante. El costo unitario del equipo es elevado, en

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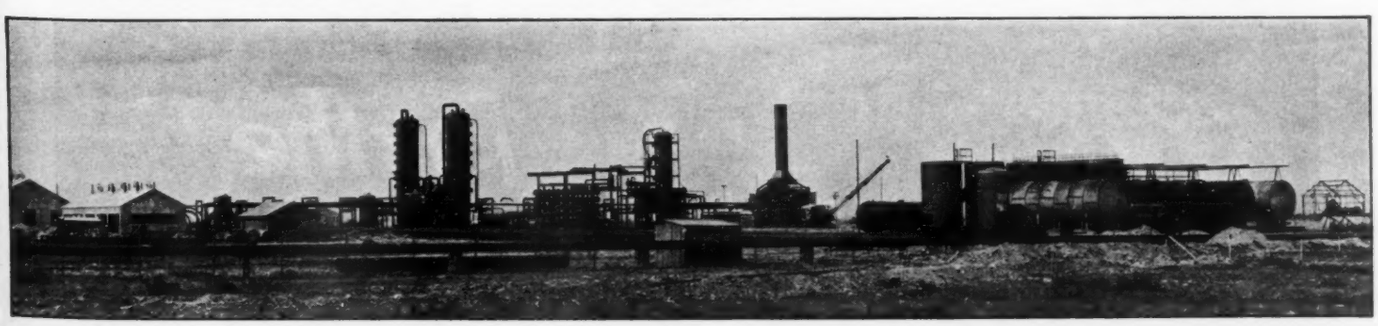
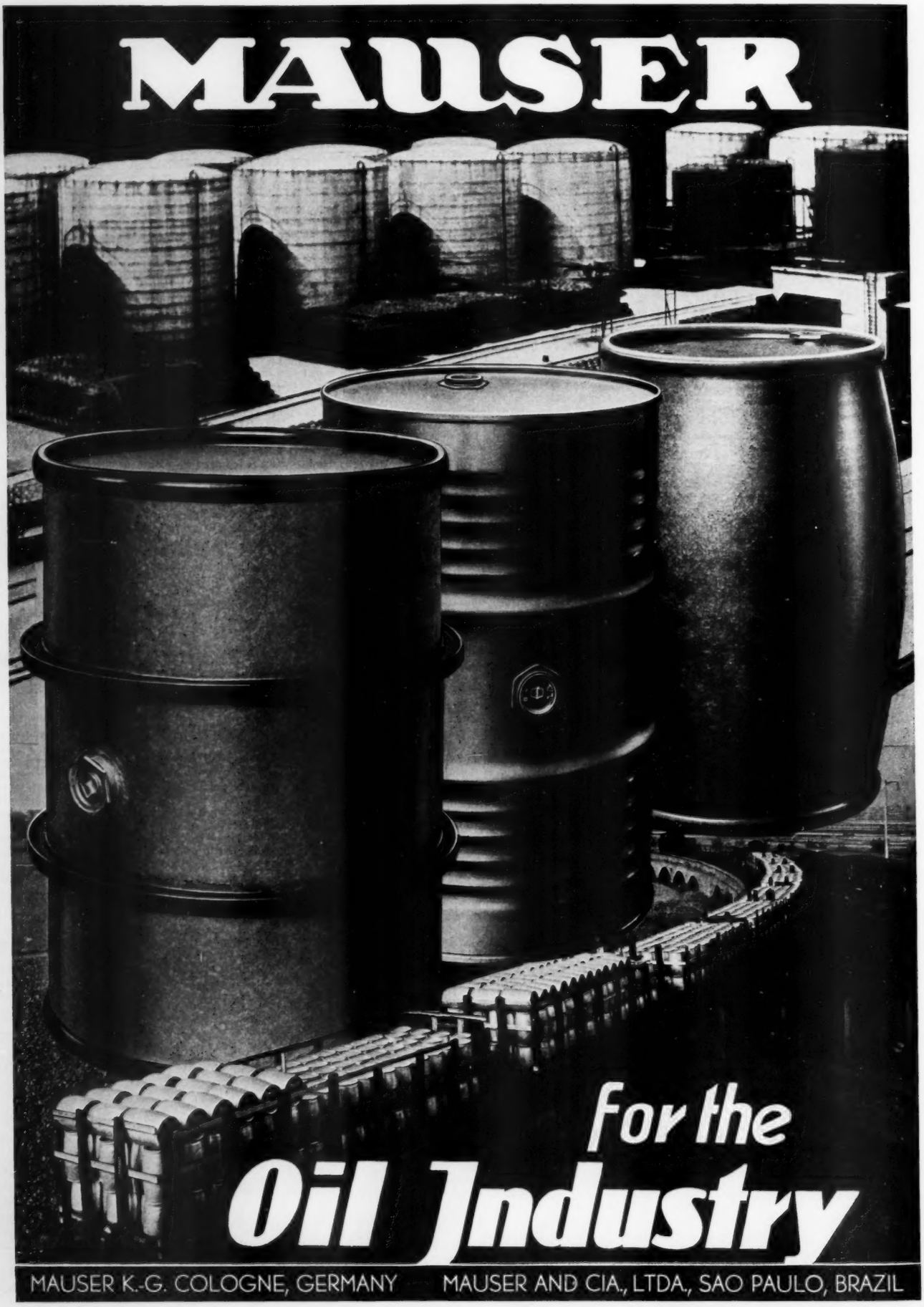


Combination natural gasoline recovery unit and polymerization unit being built by the Phillips Petroleum Co. at Goldsmith, Tex.
Groupe combinaison de recuperation d'essence naturelle et de polimerisation en construction par la Phillips Petroleum Co. a Goldsmith, Tex.
Combinacion de instalacion de recuperacion de gasolina natural y de instalacion de polimerizacion, bajo construccion, por la Phillips Petroleum Co., en Goldsmith, Tex., E.U.A.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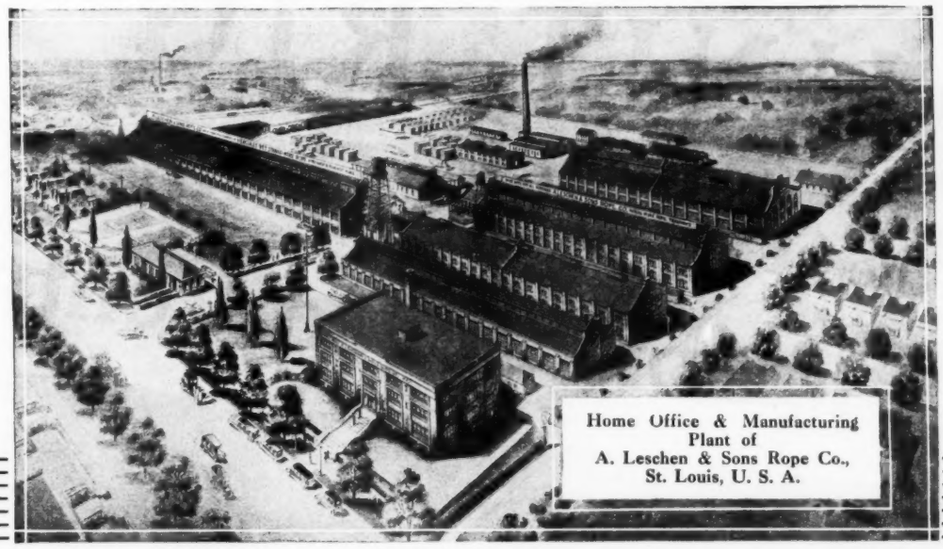

Home Office & Manufacturing Plant of A. Leschen & Sons Rope Co., St. Louis, U. S. A.

SYMBOLIC

To users of Leschen Wire Lines in all parts of the world, a picture of the Leschen Plant means more than just a group of factory buildings — more than a mass of steel and stone.

To them, it symbolizes the eighty-year-old Leschen ideals of highest quality . . . the expertness of manufacture . . . the rigid tests and inspections which assure unfailing dependability for Leschen Wire Lines . . . an inspiration to all who constantly seek to better their own best efforts.

Leschen Wire Lines are made in a wide range of constructions, including round strand, flattened strand, and non-rotating types. Complete descriptive literature and prices gladly furnished on request.

SYMBOLIQUE

Pour les usagers de câbles Leschen dans toutes les parties du monde, une photo de l'usine Leschen signifie plus qu'un simple groupe de bâtiments—plus qu'une masse d'acier et de briques.

Pour eux, cela symbolise l'idéal Leschen de la plus haute qualité, qui de quatre-vingts ans . . . la compétence dans la partie . . . les essais et inspections rigides qui assurent le rendement sans défaillance des câbles Leschen . . . une véritable inspiration pour tous ceux qui cherchent sans cesse à améliorer leurs meilleurs efforts.

Les câbles Leschen sont offerts en une vaste gamme de types, y compris les types à torons ronds, à torons aplatis et non-rotatifs. Complète documentation descriptive et prix fournis gracieusement sur demande.

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Para los consumidores de cables Leschen en todas partes del mundo, una fotografía de la fábrica Leschen significa más que un simple grupo de edificos de talleres—más que una masa de acero y ladrillos.

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Los cables Leschen se ofrecen en una gran variedad de tipos, incluyéndose entre ellos los de alambres redondos, los de alambres planos y los no giratorios. A solicitud suministraremos información detallada y presios.

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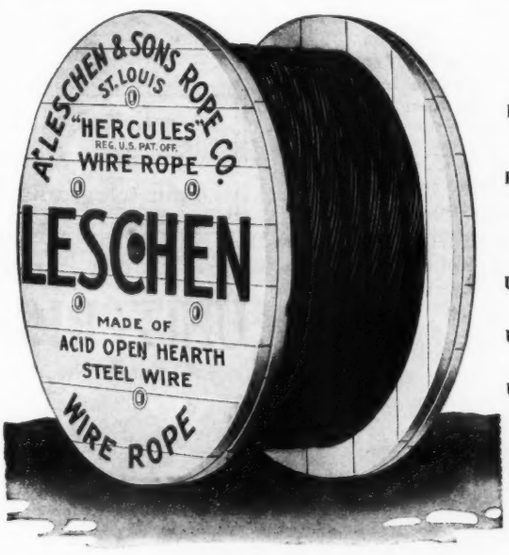

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the Portable Rotary with Flexible Speed Control

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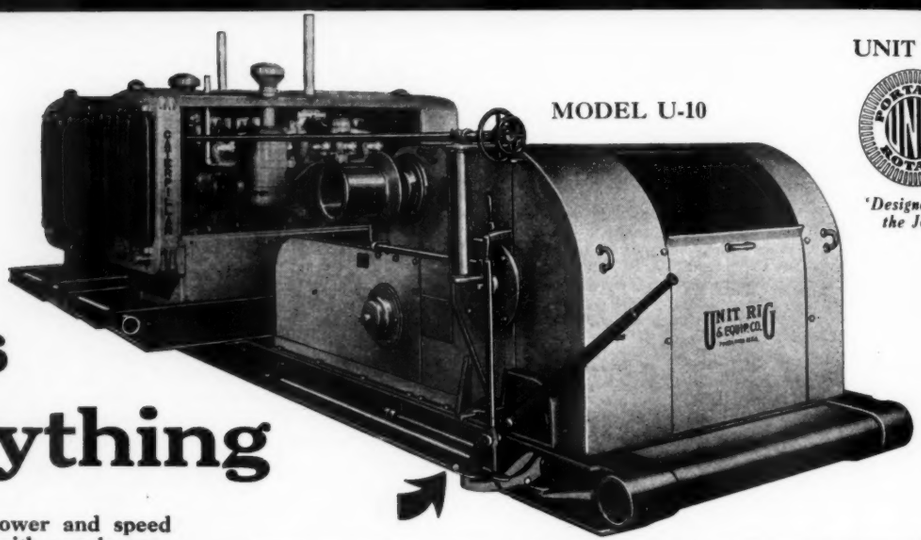

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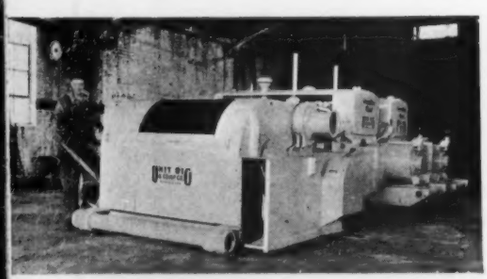

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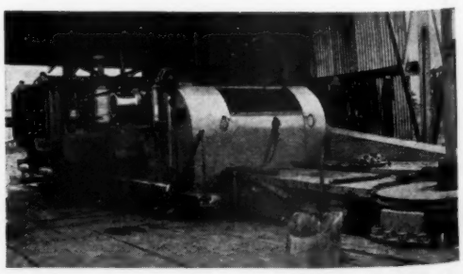

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UNIT RIG

nary gasoline plant equipment handling similar volumes. The value of the product is, of course, correspondingly higher. For these reasons, it is not likely that a large number of polymerization units will be built in or replace present natural gasoline plants. Also, it will be necessary to segregate large quantities of liquid butanes, propanes, pentanes and higher fractions before even a relatively small polymerization unit may be justified economically.

MARKETING PROBLEMS

Furthermore, after the vapors are converted to motor fuel, it will be necessary to distribute this product economically and no one can foresee whether this new product will be moved to refineries for blending with refinery gasoline as is done with natural gasoline or whether it is to be sold as a motor fuel direct, in competition with refinery gasoline.

From the experience gained from the introduction and wide use of stabilization to make low-vapor pressure gasolines, the natural gasoline industry might find it most economical to distribute its polymerized gasoline among refiners who are already equipped with marketing facilities.

Except for the introduction of polymerization, the natural gasoline industry continues to operate along lines pretty much the same as those of a year ago. It is also rather certain that the great bulk of the present plants will continue to operate with but little change over the life of the plant.

VAPOR RECOVERY EQUIPMENT

Vapor recovery equipment has not been changed a great deal. Well-pressure plants in a few areas call for exceptionally heavy absorption equipment but these are exceptions. The great bulk of the absorption is carried out in plants equipped with gas compressors and while these have been designed to operate with a greater power output for a given fuel consumption, the result has been a saving in operating costs and space rather than any radical change in operation. In some instances, the refrigerating value of expanding butane was utilized to lower the temperature of the absorption oil but this could hardly be called a discovery of the past year.

FRACTIONATING EQUIPMENT

Similarly, there has been little change in the design of fractionating equipment. The towers, reboilers, etc., have become fairly well standardized for each type of unit and there is a decidedly lesser tendency to incorporate "home made" devices in the units. Fractionating equipment is now designed and built as a unit, sensitive to changes within itself, but highly dependable and efficient if left unaltered. It is, of course, automatically controlled, the operator simply setting the conditions according to the vapor pressure of the product desired.

As one phase of fractionation, it should be pointed out that a increasing volume of narrow-range boiling point products is moving from some plants in the form of solvents, paint constituents, etc. Where such specialties are made, exceptionally close fractionating equipment is employed, but the basic design of this follows that of the conventional bubble tower.

des produits est proportionnellement plus élevée. C'est pourquoi il est peu probable qu'un grand nombre de groupes de polimérisation soient installés ou viennent remplacer des installations actuelles d'essence naturelle. En outre, il sera nécessaire de séparer de fortes quantités de butanes, propanes, pentanes et plus hautes fractions liquides avant qu'il puisse être question d'installer sur une base économique un groupe de polimérisation même relativement réduit.

PROBLEMES DES DEBOUCHES

Outre cella, il sera nécessaire, après que lesdites vapeurs auront été converties en carburant moteur, d'assurer une distribution économique à ce produit, et personne ne peut dire encore si ce nouveau produit sera dirigé sur les raffineries pour être mélangé avec de l'essence de raffinerie comme c'est le cas avec l'essence naturelle, ou s'il faudra le vendre directement comme carburant moteur en concurrence avec l'essence de raffinerie.

Si l'on se base sur l'expérience acquise par l'introduction et l'emploi général de la stabilisation dans la fabrication des essences à basse pression de vapeurs, l'industrie de l'essence naturelle pourrait fort bien trouver de son intérêt de distribuer son essence de polimérisation parmi les raffineurs qui ont déjà tous les débouchés à leur disposition.

Si ce n'est pour l'introduction de la polimérisation, l'industrie de l'essence naturelle continue à être conduite sur des bases très voisines de celles de l'an dernier. Il est aussi à peu prés sûr que la grande majorité des installations actuelles vont continuer à fonctionner avec très peu de changement pendant toute la durée du matériel.

MATERIEL DE RECUPERATION DE VAPEURS

Le matériel de récupération de vapeurs n'a guére subi de changement. Dans un petit nombre de régions, des installations de pression de puits demandent un matériel d'absorption exceptionnellement fort, mais ce sont là des exceptions. La majeure partie de l'absorption se fait dans des installations équipées avec des compresseurs de gaz, et bien que ces derniers aient été conçus pour fonctionner avec un plus grand rendement de puissance pour une consommation donnée de combustible, il en est résulté une économie de frais d'exploitation et de place plutôt qu'un changement radical de la marche. Dans certains cas, on a tiré parti du pouvoir réfrigérant du butane soumis à la détente aux fins d'abaisser la température de l'huile d'absorption, mais on ne pourrait guère appeler cela une découverte de l'an dernier.

MATERIEL DE FRACTIONNEMENT

De même, il y a eu très peu de modification d'apportée à la construction du matériel de fractionnement. Les tours, les chaudières de rechauffe, etc., ont été à peu près partout standardisées pour chaque type d'installation et la tendance à introduire des dispositifs de fortune dans les groupes est de plus en plus faible. Le matériel de fractionnement est maintenant conçu et réalisé comme une unité, sensible aux changements qu'on pourrait y apporter en son sein, mais des plus sûrs et efficaces si on le laisse intact. Bien entendu. le contrôle en est automatique, l'opérateur n'ayant qu'a en régler les conditions de marche en se basant sur la pression de vapeurs du produit qu'on désire obtenir.

En tant que phase du fractionnement, il convient de signaler qu'un volume en croissance de produits de gamme réduite de points d'ébullition sort de certaines installations sous la forme de solvants, d'éléments constitutifs de peinturs, etc. Là où l'on fait ce genre de spécialités, on a recours à du matériel de fractionnement de grande précision, mais le type de base de ce matériel suit celui de la tour de barbotage clasique.

comparación con el de una instalación corriente de gasolina de igual capacidad productiva. Por otra parte, el valor de los productos es proporcionalmente más alto. Es precisamente por estas razones que no es probable que se instalen numerosas instalaciones de polimerización o que vengan a reemplazar las instalaciones corrientes actuales de gasolina natural. Por otra parte, será necesario separar grandes cantidades de butanos, propanos y otras fracciones más volátiles, en forma líquida, antes de que se justifique la instalación de un equipo de polimerización, por pequeño que sea, sobre una base económica.

PROBLEMAS DE DISTRIBUCION

Por otra parte, será necesario, a continuación de que dichos vapores hayan sido convertidos en combustible de motor, el asegurar una distribución económica a este producto, y nadie puede decir todavía si este nuevo producto será enviado a las refinerías, para ser aquí mezclado con la gasolina de refinería, como sucede con la gasolina natural, o si habrá necesidad de venderlo directamente como combustible de motor, en competencia con la gasolina de refinería.

Si uno se basa sobre la experiencia adquirida en la introducción y el empleo general de la estabilización en la fabricación de gasolinas de baja presión de vapor, la industria de la gasolina natural podría entonces encontrar conveniencia propia en distribuir su gasolina de polimerización entre los refinadores que tienen ya establecida una buena organización de ventas.

Si no fuera por la introducción de la polimerización, la industria de la gasolina natural continuaría siendo conducida sobre casi las mismas bases del año pasado. Se presenta también la seguridad de que casi todas las grandes instalaciones actuales continuarán funcionando con muy pocos cambios durante toda la existencia efectiva de us equipos.

EQUIPO DE RECUPERACION DE VAPORES

El equipo de recuperación de vapores tampoco ha experimentado reformas importantes. En un limitado número de regiones, las instalaciones de presión de pozo exigen un equipo de absorción excepcionalmente fuerte, pero ésto es la excepción a la regla general. La mayor parte de la absorción se hace en las instalaciones provistas de compresores de gas, y como estas máquinas están proyectadas para funcionar con un gran rendimiento de fuerza para una consumo dado de combustible, el resultado es una economía en gastos de explotación y de espacio, en lugar de un cambio radical en la operación. En ciertos casos, se ha sacado partido del efecto refrigerante del butano sometido a dilatación, para reducir la temperatura del material de absorción, pero ésto no podría llamarse un descubrimiento del año pasado.

EQUIPO DE FRACCIONACION

Al mismo tiempo, se observa muy poco cambio en la construcción de los equipos de fraccionación. Las torres, las calderas de recalentamiento, etc., se han hecho en tipos bien uniformados para cada procedimiento y se presenta cada día menor tendencia hacia la introducción, en estas instalaciones, de dispositivos o aparatos improvisados. El equipo de fraccionación es ahora proyectado y construído en la forma de un grupo unificado, sensible a los cambios dentro de su propio interior, más seguro y eficaz, cuando no se le altera en ningún sentido. Tiene, por supuesto, un gobierno automático. Todo lo que hace el encargado es regular las condiciones de funcionamiento, basándose sobre la presión de los vapores del producto por recuperarse.

Como una fase de la fraccionación, bueno es indicar aquí que una creciente cantidad de productos, comprendidos en una reducida escala de puntos de ebullición, sale de ciertas instalaciones bajo la forma de solventes, elementos constitutivos de pintura, etc. En las instalaciones donde se hacen estas especialidades, se emplea un equipo de fraccionación de gran precisión, pero el proyecto fundamental de semejante es siempre igual al de la torre de burbujeo de tipo normal.

McCORD LUBRICATORS

Standard Lubricators of the Oil Field

THE McCORD "LD" LUBRICATOR

DEPENDABLE—ACCESSIBLE—ECONOMICAL

The McCord Class "LD" Lubricator is the only one of the two plunger sight feed type that shows the oil is actually being delivered to the cylinder or part being lubricated. This is an exclusive McCord Safety feature which definitely shows at all times that the lubricator is functioning properly. In the McCord Class "LD" after the oil has passed through the sight feed glass, undetected leakage is impossible, an additional safeguard that makes for dependable service.

The performance of McCord "LD" Force Feed Lubricators meets the most exacting requirements of lubricator service. Pump units can be adjusted to deliver varying quantities of oil from a fraction of a drop to a constant stream, and at any and all speeds. The ability to deliver minute quantities of oil against extremely high pressure is an inbuilt characteristic of McCord Lubricators. The adjustment of the pump units once made remains unchanged, even extreme changes in temperatures have no effect on the adjustment. The same quantity of oil is delivered when using a light oil as when using a heavy cylinder oil. Every McCord pump unit is tested against 2000 pounds pressure. A hand crank opposite the driving mechanism permits flushing the parts to be lubricated with oil before starting. It may also be used to accelerate the feed, while the lubricator is in operation, in case of emergency. A large filler cap is used permitting ease and rapidity of filling. A drain plug is fitted, at the bottom of reservoir. A gauge glass shows the oil level in the reservoir, and where desirable, lubricators can be furnished with two compartments for delivering different kinds of oil.

Reservoir capacities 1 qt. to 4 gal. Feeds 1 to 24—30 Standard sizes.

Catalog and Price List on Request.

McCORD CLASS "SF" LIQUID SIGHT FEED LUBRICATOR

1. Positive Oil Delivery at all Times.

McCord Class "SF" Lubricators have been designed to deliver oil at frequent and regular intervals, in a predetermined charge sufficiently large to maintain the oil film on moving surfaces.

2. Rugged Pump Construction.

McCord pump units are simple, sturdy and accurate, positive in operation and independently mounted. McCord pump units are the most accurate and efficient known.

3. Flexibility of Oil Delivery.

McCord Class "SF" Mechanical Lubricators have the most flexible and accurate oil delivery known. It is not necessary to disassemble any part of a McCord Class "SF" lubricator in order to make adjustments.

4. Removable Pump Units.

Any pump unit may be removed on the McCord Class "SF" Lubricator without stopping the lubricator, nor in any way interfering with its operation.

5. Adaptability to Source of Power.

Eighteen types of drive are provided on the McCord Class "SF". A McCord Class "SF" Lubricator may be placed anywhere, either directly on the machine or remote from it, according to the requirements of the job.

6. Taper Nozzle Gives Accurate Oil Delivery.

The size of the oil drop leaving the tapered sight-feed nozzle is approximately one gravity drop, the universal standard for measuring lubricants. The nozzle is readily removable giving access to the sight feed check ball.

THE McCORD TYPE "C" CHEMICAL MEASURING PUMP

The design of this McCord pump incorporates these important features:

(1) The ability to deliver a predetermined amount of liquid, proportioned according to the requirements, over a definite period of time, or a measured quantity, according to speed of the operating machine.
(2) Second only to accuracy is dependability and all units of the McCord pump are designed with long life and durability—an important consideration.
(3) Individual removable pump units make for easy adjustment, for quick removal for cleaning.
(4) All working parts are completely enclosed, operating in oil, fully protected from dust, dirt and the elements.
(5) The McCord design insures positive delivery of liquids even against pressure as high as 2,000 lbs.
(6) McCord engineering is further evident in the fact that the driving mechanism can be readily removed by taking out four bolts, providing it is desired to change to rotary or ratchet drive.

Accuracy of delivery is possible because of the finely engineered design with a minimum number of parts, carefully machined to McCord's close standards. All working parts are enclosed, fully protected from dust, dirt and the elements.

When used for the delivery or injection of chemicals into crude oil lines an auxiliary chemical tank, made of terneplate, of three-gallon capacity is provided. This tank is connected to the suction side of the pump. For this service pump units, made of steel, are used. (Pump units made of other alloys can be supplied.)

CAPACITY

The ½-inch plunger model delivers one pint of liquid in 261 plunger movements. The ¾-inch plunger model delivers one pint of liquid in 464 plunger movements, while the ⅝-inch plunger model delivers one pint in 167 plunger movements. Catalog on request.

LE GRAISSEUR McCORD "LD"

REGULIER—ACCESSIBLE—ECONOMIQUE

Le graisseur McCord Classe "LD" est le seul du type à débit visible et à deux plongeurs qui permet de suivre la goutte d'huile jusqu'à son arrivée au point du cylindre ou de toute autre pièce à lubréfier. C'est là un dispositif de sûreté exclusif à McCord qui permet de s'assurer en tout temps que le graisseur fonctionne bien. Dans le graisseur McCord de Classe "LD", après que l'huile a passé à travers la vitre à débit visible, une fuite ne peut manquer d'être remarquée, un avantage en plus qui assure un service de tout repos.

Le fontionnement des graisseurs McCord "LD" à débit visible répond aux exigences les plus dures de service de graissage. Les groupes de pompe peuvent être réglés de façon à faire varier le débit de l'huile depuis une fraction de goutte jusqu'à un jet continu, et cela à toute vitesse désirée. La faculté de débiter des quantités infimes d'huile en présence de pressions très élevées est une caractéristique inhérente aux graisseurs McCord. Une fois le réglage des groupes de pompe effectué, il ne se dérange plus, et même les changements extrêmes de températures n'ont pas d'effet sur ce réglage. La même quantité d'huile est débitée lorsqu'on fait usage d'une huile légère tout comme lorsqu'on emploie une huile lourde de cylindres. Chaque groupe de pompe McCord est éprouvé en présence d'une pression de 2000 lbs. Une manivelle prévue en face du mécanisme de commande permet de noyer pièces à lubréfier dans l'huile avant la mise en marche. On peut aussi employer cette manivelle pour accélérer le débit une fois la graisseur en service, dans les cas de nécessité. Il est prévu un gros chapeau de remplisseur qui permet d'effectuer le remplissage rapidement et facilement. Un bouchon de drainage est prévu à la base du réservoir. Un verre de jauge montre le niveau de l'huile dans le réservoir, et quand on le désire, les graisseurs peuvent être fournis avec deux compartiments afin de débiter différentes sortes d'huiles.

Capacités de réservoir 1 quart à 4 gallons. Débits 1 à 24—30 grandeurs standard.

Catalogue et tarif sur demande.

GRAISSEUR LIQUIDE McCORD DE CLASSE "SF" A DEBIT VISIBLE

1 Débit positif d'huile en tout temps.

Les graisseurs McCord de Classe "SF" ont été conçus pour débiter l'huile à des intervalles réguliers et fréquents, avec une charge déterminée à l'avance et assez forte pour maintenir une pellicule d'huile sur les surfaces en mouvement.

2. Robustesse de construction des pompes.

Les groupes de pompe McCord sont simples, robustes et précis, de fonctionnement positif et de montage indépendant. Les groupes de pompe McCord sont les plus précis et les plus efficaces que l'on connaisse.

3. Souplesse du débit d'huile.

Les graisseurs mécaniques McCord de Classe "SF" ont le débit d'huile le plus souple et le plus précis qu'on connaisse. Il est pas nécessaire de démonter aucune pièce du graisseur McCord de Classe "SF" pour procéder à des réglages.

4. Groupes de pompe amovibles.

Sur le graisseur McCord de classe "SF", on peut démonter tout groupe de pompe sans devoir arrêter le graisseur, ni devoir en aucune façon gêner son bon fonctionnement.

5. Adaptabilité à la source de force motrice.

Il est prévu dix-huit types de commande sur le graisseur McCord de Classe "SF". On peut monter un graisseur McCord do Classe "SF" n'importe où, soit directement sur la machine, soit à distance, selon les conditions imposées par le travail dont il s'agit.

6. Buse conique assurant un débit d'huile précis.

La grosseur de la goutte d'huile qui tombe de la buse conique de débit visible est environ une goutte de gravité, l'étalon de mesure universel pour les lubréfiants. La buse se démonte facilement, ce qui donne accés à la bille d'arrêt de débit visible.

LA POMPE DE DOSAGE CHIMIQUE McCORD DE TYPE "C"

La construction de cette pompe McCord comprend les importantes caractéristiques suivantes:

(1) La faculté de débiter une quantité fixée à l'avance de liquide, dosée d'après les besoins, pendant une période donnée de temps, ou une quantité réglée d'après la vitesse de la machine en marche.
(2) Après la précision vient la régularité, et toutes les unités de la pompe McCord sont prévues pour un maximum de longévité et de durabilité—un élément essentiel.
(3) Des unités de pompe individuelles et démontables qui permettent un réglage facile et un démontage rapide pour le nettoyage.
(4) Toutes les pièces mobiles sont complètement enfermées, fonctionnant dans l'huile, entièrement à l'abri de la poussière, des impuretés et des éléments.
(5) La construction McCord assure un débit positif des liquides, même en présence de pressions allant jusqu'à 2.000 lbs.
(6) La supériorité de la technique McCord est encore mise en évidence par le fait que le mécaniame de commande peut facilement s'extraire en enlevant quatre boulons, à condition que l'on désire passer à la commande rotative ou à rochet.

La précision du débit d'huile est rendu possible grâce à la construction soigneusement étudiée avec un minimum de pièces, usinées avec le plus grand soin selon les standards rigides de McCord. Toutes les pièces mobiles sont enfermées, complètement à l'abri de la poussière, des impuretés et des éléments.

Lorsqu'on emploie ces graisseurs pour débiter ou injecter des produits chimiques dans des conduites de pétrole brut, il est prévu un réservoir chimique auxiliaire, en tôle plombée, d'une contenance de trois gallons. Ce réservoir est relié au côté d'aspiration de la pompe. Pour cet emploi, on fait usage d'unités de pompe en acier. (On peut aussi faire la fourniture d'unités de pompe en autres alliages).

DEBIT

Le modèle à plongeur de ½ pouce débite une pinte de liquide en 261 mouvements du plongeur. Le modèle à plongeur de ¾ de pouce débite une pinte de liquide en 464 mouvements du plongeur, alors que le modèle à plongeur de ⅝ de pouce débite une pinte en 167 mouvements de plongeur. Catalogue sur demande.

EL LUBRICADOR McCORD "LD" SEGURO—ACCESIBLE—ECONOMIO

El lubricador McCord, de clase "LD" es el único tipo de alimentación visible, de dos émbolos, que permite seguir con la vista la gota de aceita hasta que lleva al punto del cilindro o de cualquier otra parte, que ha de recibirla para su lubracción. Esto constituye un rasgo de seguridad exclusivo del lubricador McCord, que permite asegurarse, en cualquier momento, de que el lubricador está funcionando bien. En el lubricador McCord, después de que el aceite ha pasado por el vidrio de alimentación visible, el escape nunca puede pasar sin ser observado, lo que esuna adicional ventaja de seguridad de correcto servicio.

El funcionamiento de los lubricadores McCord "LD" de alimentación visible responde a los requisitos más exigentes en servicio de lubricación. Los grupos de bombas peuden regularse para variar la alimentación del aceite desde una fracción de gota hasta un chorro continuo y todo esto a la velocidad que se quiera. La facultad de poder alimentar una mínima cantidad de aceite en presencia de presiones bien elevadas es una característica inherente de los lubricadores McCord. Después de regulado el grupo de bombas, la aliementación fijada no puede alterarse. Aun los más violentos cambios de temperatura no tienen ningún efecto sobre la regulación de la lubricación fijada. Se alimenta siempre la misma cantidad de lubricante, ya se trate de un aceite liviano o de un aceite pesado de cilindros. Cada bomba del grupo de bombas McCord se ensaya bajo una presión de 2000 libras. Una manivela al frente del mecanismo propulsor permite inyectar libremente aceite en las piezas por lubricarse, antes de que se ponga en acción normal el lubricador. Esta misma manivela puede emplearse para aumentar o acelerar la alimentación durante el mismo funcionamiento del lubricador, en caso de necesidad. Está provisto de un henchidor grande, para rellenarlo con facilidad y rapidez. Al fondo del recipiente hay un tapón de evacuación. Un tubo de vidrio indica en todo momento el nivel del lubricante en el receptáculo. Estos lubricadores pueden también suministrarse, cuando así se pidan, con dos receptaculos de lubricantes, para la alimentación de dos clases de aceite.

Capacidades del recipiente, de 1 cuarto de galón a 4 galones. Alimentaciones de 1 a 24-30 de tamaños normales.

A solicitud enviaremos catálogo y lista de precios.

LUBRICADOR LIQUIDO McCORD DE CLASE "SF" DE ALIMENTACION VISIBLE

1. Alimentación positiva de aceite en todo momento.

Los lubricadores McCord de clase "SF" han sido proyectados especialmente para alimentar aceite a intervalos regulares y frecuentes, con una carga determinada de antemano bastante grande para mantener una película de aceite sobre las superficies en movimiento.

2. Bombas de construcción bien firme.

Los grupos de bombas McCord son sencillos, firmes y precisos, de funcionamiento positivo y de montaje independiente. Los grupos de bombas McCord son los más eficaces del mercado.

3. Flexibilidad de la alimentación de aceite.

Los lubricadores mecánicos McCord de clase "SF" tienen la alimentación de aceite más flexible y más precisa que se conoce en la industria. No hay necesidad de desmontar ninguna pieza del lubricador McCord de clase "SF" para efectuar su regulación.

4. Grupos de bombas amovibles.

Del lubricador McCord de clase "SF" se puede desmontar cualquier grupo de bomba sin tener que parar el lubricador o sin que este separación afecte de alguna manera su buen funcionamiento.

5. Adaptabilidad a la fuente de fuerza motriz.

Para los lubricadores McCord de clase "SF" se han provisto diez y ocho tipos de propulsión o mando. El lubricador McCord de clase "SF" puede instalarse en cualquier punto, ya sobre la misma máquina, ya a distancia de ella, según las condiciones del trabajo que se presente.

6. Boquilla cónica para asegurar una precisa alimentación.

El tamaño de la gota de aceite que cae de la boquilla cónica de alimentación visible es alrededor de una gota de gravedad, que es la medida universal para los lubricantes. La boquilla o surtidor puede desmontarse con facilidad, permitiendo inmediato acceso a la válvula esferica de retención de la alimentación visible.

LA BOMBA DE DOSIFICACION QUIMICA McCORD DE TIPO "C"

La construcción de esta bomba McCord comprende las importantes características siguientes:

(1) La facultad de alimentar una cantidad fijada de antemano de liquido, dosificada según las necesidades del caso, durante unperíodo dado de tiempo, o una cantidad regulada de acuerdo con la velocidad de la máquina en marcha.
(2) A continuación de la precisión viene la seguridad. Todas las piezas de la bomba McCord se hacen de modo que rindan mucho tiempo de servicio práctico, lo que es un elemento esencial.
(3) El fácil desmontaje de todas las piezas de la bomba McCord permite un ajuste rápido y preciso y una limpieza completa.
(4) Todas las piezas móviles están completamente encerradas, funcionando en aceite, completamente protegidas contra el polvo, tierra y los elementos naturales.
(5) La construcción McCord asegura una alimentación positiva de liquidos, aun en presencia de presiones hasta de 2.000 libras.
(6) La superioridad técnica de la bomba McCord se pone una vez más de evidencia mediante el hecho de que el mecanismo de propulsión puede extraerse con facilidad quitando sencillamente cuatro pernos, en el caso en que se desee pasar a propulsión rotativa o de trinquete.

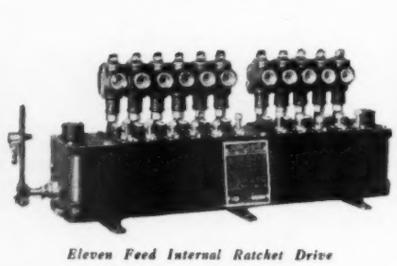
La precisión de la alimentación de aceite se debe fundamentalmente a la construcción esmeradamente estudiada con un mínimo número de piezas, todas labradas a máquina con sumo cuidado, de acuerdo con las rígidas normas de todo producto McCord. Todas las piezas móviles están encerradas, completamente protegidas contra el polvo, tierra y los elementos.

Cuando se emplean estas bombas para alimentar o inyectar productos químicos en los conductos de petróleo crudo, se proveen de un depósito químico auxiliar, de lámina con revestimiento de plomo, con cabida para tres galones. Este depósito se une al lado de aspiración de la bomba. Para este servicio se emplean bombas de acero. (También podemos suministrar unidades de bombas de especiales aleaciones de acero.)

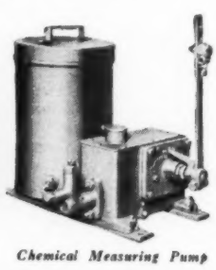
CAPACIDAD

El modelo de émbolo de ½ pulgada alimenta una pinta (como un litro) de líquido en 261 movimientos de émbolo. El modelo de ¾ de pulgada alimenta una pinta de líquido en 464 movimientos de embolo, y el modelo de ⅝ de pulgada alimenta una pinta en 167 movimientos de émbolo. Catálogo a solicitud.

4 Feed "LD" Lubricator



Eleven Feed Internal Ratchet Drive



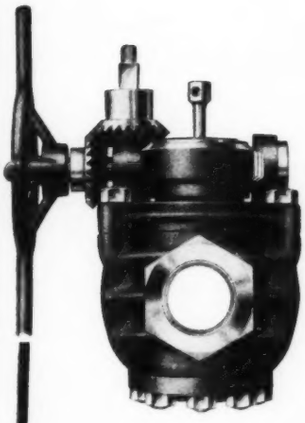
Chemical Measuring Pump

Other McCord Products: Metallic Asbestos Gaskets; Engine Cooling Radiators; Unit Heaters.

McCORD RADIATOR & MFG. CO., DETROIT, U.S.A.

NEWMAN-MILLIKEN

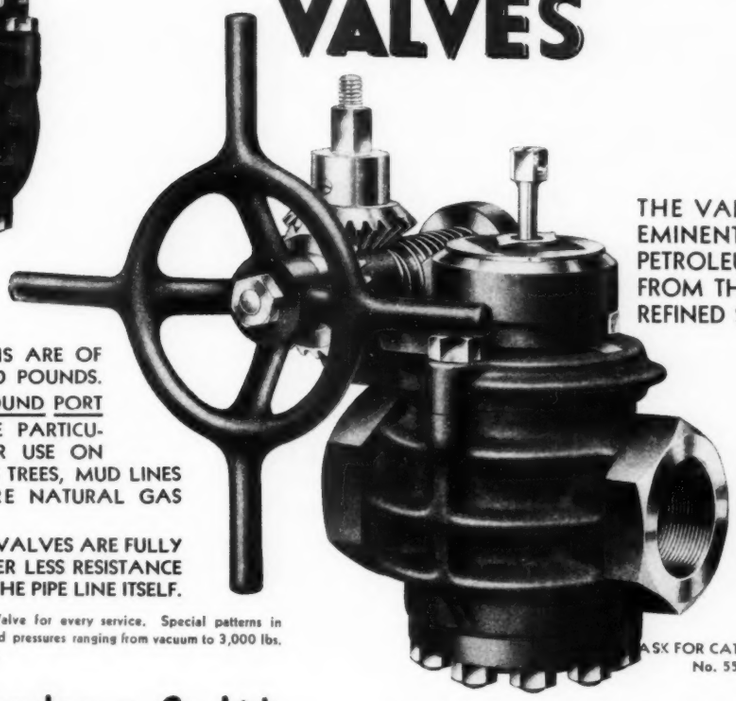
GLANDLESS LUBRICATED PLUG VALVES



NOTE THEIR UNIQUE FEATURES:—

- PARALLEL PLUG—ALWAYS IN CLOSE WORKING CONTACT WITH ITS BODY SEATING, NO GRIT CAN THEREFORE GET BETWEEN THESE TWO SURFACES.
- NO GLAND—NO PACKING—NO GASKETS.
- SELF SEALING.
- VISUAL CHECK ON FULL LUBRICATION.
- PORT OPENINGS EQUAL TO FULL SIZE PIPE AREA.
- OPENED AND CLOSED BY QUARTER TURN OF PLUG.

THE VALVE THAT HAS PROVED ITSELF EMINENTLY SUITABLE FOR HANDLING PETROLEUM PRODUCTS IN ALL STAGES FROM THE CRUDE TO THE MOST HIGHLY REFINED SPIRITS.

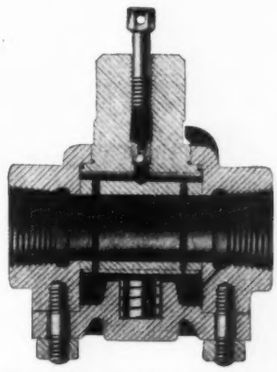


THESE ILLUSTRATIONS ARE OF OUR SERIES 2000/3000 POUNDS. W. P. CAST STEEL ROUND PORT VALVES WHICH ARE PARTICULARLY SUITABLE FOR USE ON OIL WELL CHRISTMAS TREES, MUD LINES AND HIGH PRESSURE NATURAL GAS SERVICES.

THE PORTS OF THESE VALVES ARE FULLY MACHINED AND OFFER LESS RESISTANCE TO THE FLOW THAN THE PIPE LINE ITSELF.

THERE is a Newman-Milliken Valve for every service. Special patterns in special metals are available and pressures ranging from vacuum to 3,000 lbs. per square inch can be dealt with.

ASK FOR CATALOGUE No. 55M



SECTIONAL VIEW OF ROUND PORT WRENCH OPERATED VALVE

Newman, Hender & Co. Ltd

WOODCHESTER. NH GLOS. ENGLAND.

SOLE LICENSEES THROUGHOUT THE WORLD WITH THE EXCEPTION OF THE U. S. A.

FOR ALL DEEP WELL DRILLING

These deep well drilling plants of the latest design offer enormous advantages over the chains and sprockets formerly used. No foundations are required for the machines, and the derrick can be shifted without having to dismount the draw works and drilling aggregate.

DEMAG ROTARY PLANTS

Agents for U. S. A.: Seamless Steel Corporation, New York, Broadway 39

Welding crew working, tieing together several lengths of pipe preparatory to placing them in line for the final welding work
Equipe de soudage au travail, en train de relier ensemble plusieurs longuers de tuyau avant de les mettre en ligne pour le travail de soudage final
La cuadrilla de soldadores se ve aqui atando tubos de varios largos, en preparacion para su colocacion en linea, para su soldadura final

Transportation

AUTOMATIC SAMPLING

It is necessary to know quite accurately the kind of oil passing through a pipe line at any time and to obtain this information the oil must be sampled. This practice is not new, but it has been done by hand in the past. Recently an automatic mechanical sampler has been developed and it promises to help solve this general problem of checking oil.

One of the older types of manually operated samplers consists of a relatively short piece of three-eighths or one-half inch tubing bent at the upper end and drilled with a series of small holes at the lower end. The drilled portion is inserted and sealed in the pipe through a hole drilled in the top wall of the pipe. This short section of pipe is fitted with a small valve and when the operator desires to get a sample of oil from the pipe line he places or holds a pint or quart receptacle under the upper end of the curved pipe and turns the valve to permit the fluid to run into the measuring vessel. He empties it into an ordinary large milk can, and this sample is used by the laboratory to check the character of oil in the line.

The automatic sampler consists of a section of three-eighths or one-half inch tubing drilled with several small holes on the upstream side of the lower end and this tubing is inserted into the center of the pipe and securely fastened in this position. The upper end of this tube terminates in a valve. This valve is automatically opened and closed by a clock-actuated mechanism set for any interval and is held open for a time increment necessary to permit a rubber diaphragm to be filled with fluid. The diaphragm is calibrated to hold a known quantity of fluid and under normal conditions is collapsed by the hydrostatic pressure exerted by a small column of water fed into the chamber containing the diaphragm from a reservoir mounted at about 12 inches above the diaphragm.

The clock actuates a cam which in turn depresses a lever attached to the valve mechanism. When the clock has reached the time-point for opening the valve, the force of the oil flowing through the pipe line under pressure sends the sample up through the tube into the diaphragm and exerts sufficient pressure inside the rubber bag to force the small body of water surrounding it back to its reservoir.

When the rubber diaphragm is filled with fluid the cam on the clock releases the lever and the valve on the sample-tube closes. Next a second valve opens and releases the fluid in the diaphragm into a sealed sample can placed beneath the dia-

(Continued on Page 285)

La transportation

ECHANTILLONAGE AUTOMATIQUE

Il est nécessaire de savoir très exactement le type de pétrole qui passe dans un pipe-line à chaque instant, et pour obtenir cette indication il convient d'échantillonner le pétrole. Cette pratique n'est pas nouvelle, mais elle se faisait dans le passé à la main. Tout récemment on a mis au point un échantillonneur mécanique automatique qui promet d'aider à résoudre ce problème général de la vérification des pétroles.

Un des plus anciens types d'échantillonneurs fonctionnant à la main consiste d'un morceau relativement court de tubage de trois huitièmes ou d'un demi pouce, courbé au bout supérieur et foré d'une série de petits trous au bout inférieur. La partie forée s'introduit et se scelle dans le tuyau à travers un trou ménagé dans la paroi de dessus du tuyau. Cette courte section de tuyau est dotée d'une petite vanne, et quand l'opérateur désire prélever un echantillon de pétrole du pipe-line, il n'a qu'à placer ou tenir un récipient d'une pinte ou d'un quart sous le bout supérieur du tuyau courbé et à tourner la vanne pour que le liquide à essayer s'écoule dans le récipient de mesure. Il en vide ensuite le contenu dans un grand bidon de lait ordinaire, et on emploie cet échantillon au laboratorie pour vérifier la nature du pétrole qui circule dans la canalisation.

L'échantillonneur automatique consiste d'une section de tube de trois huitièmes ou un demi pouce foré de plusieurs trous sur le côté à courant remontant du bout inférieur, et on introduit ce tube dans le centre du tuyau où le fixe solidement dans cette position. Le bout supérieur de ce tube se termine dans une vanne. Cetter vanne s'ouvre et se ferme automatiquement à la commande d'un mécanisme à minuterie pour tout intervalle choisi, et est maintenue ouverte pendant un laps de temps suffisant pour permettre à une membrane de caoutchouc de se remplir de liquide. Cette membrane est étalonnée comme contenant une quantité donnée de liquide et est dans des conditions normales fléchie par la pression hydrostatique exercée par une petite colonne d'eau injectée dans la chambre qui contient la membrane à partir d'un réservoir monté à environ 12 pouces au-dessus de la membrane.

La minuterie actionne une came qui à son tour appuie sur un levier fixé au mécanisme de la vanne. Lorsque la minuterie est arrivée au point régéle pour l'ouverture de la vanne, la force du pétrole qui circule à travers du pipe-line sous pression projette l'échantillon à travers le tube pour aboutir dans la membrane et exerce une pression suffisant à l'intérieur du sac en caoutchouc pour refouler la petite quantité d'eau qui l'entoure dans son réservoir.

Quand la membrane de caoutchouc est remplie de liquide, la came de la minuterie libère le levier et la soupape du tube échantillonneur se ferme. Ensuite, une deuxième soupape s'ouvre et laisse le liquide contenu dans la membrane s'écouler dans un bidon d'échantillonnage scellé qu'on a placé sous l'échantillonneur à membrane. L'eau contenue dans le petit réservoir au-dessus de la membrane

(Continué sur Page 285)

Transportacion

PROBADURA AUTOMATICA

Es necesario saber, con bastante exactitud, la clase de petróleo que está pasando, en cualquier momento, por la tubería, y para ésto es menester sacar muestras del petróleo para probarlas. Esta práctica no es cosa nueva; pero, hasta ahora se ha hecho por procedimiento manual. Ultimamente se ha perfeccionado un tomador de muestra mecánico, de funcionamiento automático, que promete resolver este general problema de verificar el petróleo.

Uno de los más antiguos tipos de tomadores de muestras consiste en un tubo relativamente corto, de tres octavos o de media pulgada de diámetro, doblado en el extremo superior y perforado con una serie de agujeros en el extremo inferior. La parte perforada se inserta y cierra en la tubería, a través de un orificio perforado en la sección superior de la tubería. Este corto tubo está provisto de una válvula pe queña, y cuando el operario desea obtener una muestra del petróleo de la tubería, coloca un receptáculo de medio litro o de un litro debajo del extremo superior del tubo doblado y abre la válvula para que el líquido caiga en el receptáculo. Vacía en seguida esta muestra del petróleo en una lata grande ordinaria, y se lleva al laboratorio, donde es examinada y analizada para verificar el caracter del petróleo en la tubería.

El sacador automático de muestra consta de un tubo corto de tres octavos o de media pulgada de diámetro, perforado con varios agujeros en el lado de la corriente remontante del extremo inferior. Este tubo se introduce en el centro de la tubería, quedando aquí firmemente asegurado. El extremo superior de este tubo termina en una válvula. Esta válvula se abre y cierra automáticamente, mediante un mecanismo de reloj, a los intervalos que se elijan, y es mantenida abierta durante un lapso de tiempo suficiente para permitir que una membrana de caucho se llene de líquido. Esta membrana o diafragma está ajustado para contener una cantidad dada de líquido y bajo condiciones normales queda aplastado por la presión hidrostática ejercida por una pequeña columna de agua, inyectada en la cámara que contiene el diafragma, proveniente de un depósito montado como a 12 pulgadas arriba del diafragma.

El mecanismo de reloj acciona una leva o excéntrica, la cual, a su turno, hace bajar una palanca unida al mecanismo de la válvula. Cuando el mecanismo de reloj ha llegado al punto fijado para la abertura de la válvula, la fuerza del petróleo, que circula por la tubería, bajo presión, hace subir la muestra por el tubo, introduciéndola en el diafragma, y ejerce una presión suficiente, dentro del saco de caucho, para hacer salir la pequeña cantidad de agua, que hay aquí y devolverla a su depósito.

Cuando el diafragma de caucho está lleno de líquido, la excéntrica del mecanismo de reloj suelta la palanca y con esto se cierra la válvula del tubo de tomar muestras. A continuación se abre una segunda válvula, la cual deja que el líquido contenido en el diafragma caiga en un recipiente de muestra cerrado, colocado debajo del diafragma. El agua en el pequeño depósito arriba del dia-

(Continué en Página 285)

B-M-W ADMORE
Insert Pump Anchor

Patent No. 2,027,783

No Working Barrels
No Seating Nipples
No Mechanical Shoes
No Pulling of Tubing

Packs off and holds down directly in the tubing itself. Saves on sucker rods and other equipment where fluid level is high and well can be pumped above bottom. Complete data on request.

The B-M-W ADMORE INSERT PUMP ANCHOR is screwed directly onto the pump and replaces the conventional cup or mechanical hold-down. The pump is run in the usual way, with no special care required. When the desired setting position is reached, the slips are tripped by lifting and turning the rods, and the packer is set by the weight of the rods.

BRADFORD MOTOR WORKS INC.
OIL WELL SUPPLIES
BRADFORD, PA. — TULSA, OKLA.

Ancre de pompe rapportée
B-M-W ADMORE

Brevet No. 2.027.783

Pas de tubes mobiles
Pas de raccords sertis
Pas de sabots mécaniques
Pas de tubage à tirer

Se bourre et se fixe directement dans le tubage même. Economise en tiges aspiratrices et autre matériel dans les cas où le niveau liquide est élevé et où on peut pomper le puits au-dessus du fond. Détails complets sur demande.

L'ANCRE DE POMPE RAPPORTEE B-M-W ADMORE se visse directement sur la pompe et remplace la cuvette habituelle ou dispositif de fixation mécanique. On fait marcher la pompe de la manière courante sans entretien spécial. Quand on a atteint la position désirée, on déclenche les patins en soulevant et tournant les tiges, et le bourrage se pose par le poids des tiges.

Ancla de bomba de inserción
B-M-W ADMORE

Patente No. 2.027.783

No hay tubos móviles
No hay conexiones de asiento
No hay zapatas mecánicas
No hay tiraje de tubería

Se inserta y afirma directamente en la misma tubería. Ahorra en vástagos de aspiración y otro material en los casos en que el nivel líquido está elevado y se puede bombear el pozo arriba del fondo. Información completa a solicitud.

EL ANCLA DE BOMBA DE INSERCION B-M-W ADMORE se atornilla directamente en la bomba y reemplaza la taza corriente o dispositivo de fijación mecánico. Se hace funcionar la bomba de la manera de costumbre, sin que requiera cuidado especial. Cuando se llega a la posición deseada, se desenganchan los patines levantando y girando los vástagos, y el obturador se coloca por el peso de los vástagos.

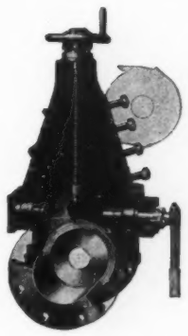
For Accurate Metering through Oil Field, Refinery and Transportation Pipe Lines.....

— — — —

Pour un mesurage précis au chantier, à la raffinerie et sur les conduites de transport .....

— — — —

Para medición precisa en el campo petrolífero, en la refinería y en las tuberías de transporte .....



.... this ROBINSON **Type E** Orifice Fitting eliminates the old style by-pass with its 40 feet of pipe and all its valves, fittings and cost of installation. Occupies no more space than an ordinary gate valve.

Orifice plate may be changed in a few minutes without interrupting the flow. Ease of changing plates encourages frequent inspection and accuracy in measurement. No by-pass valves to leak. All gases or liquids must pass through the orifice fitting. Made in all sizes for all working pressures.

Write for latest catalogue.

.... cette garniture d'orifice ROBINSON de Type E supprime l'ancien type de dérivation avec ses 40 pieds de tuyau et toutes ses soupapes, garnitures et frais d'installation. Elle n'occupe pas plus de place qu'une vanne ordinaire.

Il suffit de quelques minutes pour changer la plaque d'orifice, et cela sans interrompre l'écoulement. La facilité de changement des plaques encourage à de fréquentes visites et à la précision des mesures. Aucune soupape de dérivation pouvant fuir. Tous les gaz ou liquides doivent passer à travers la garniture d'orifice. Prévue en toutes les tailles pour toutes les pressions de travail.

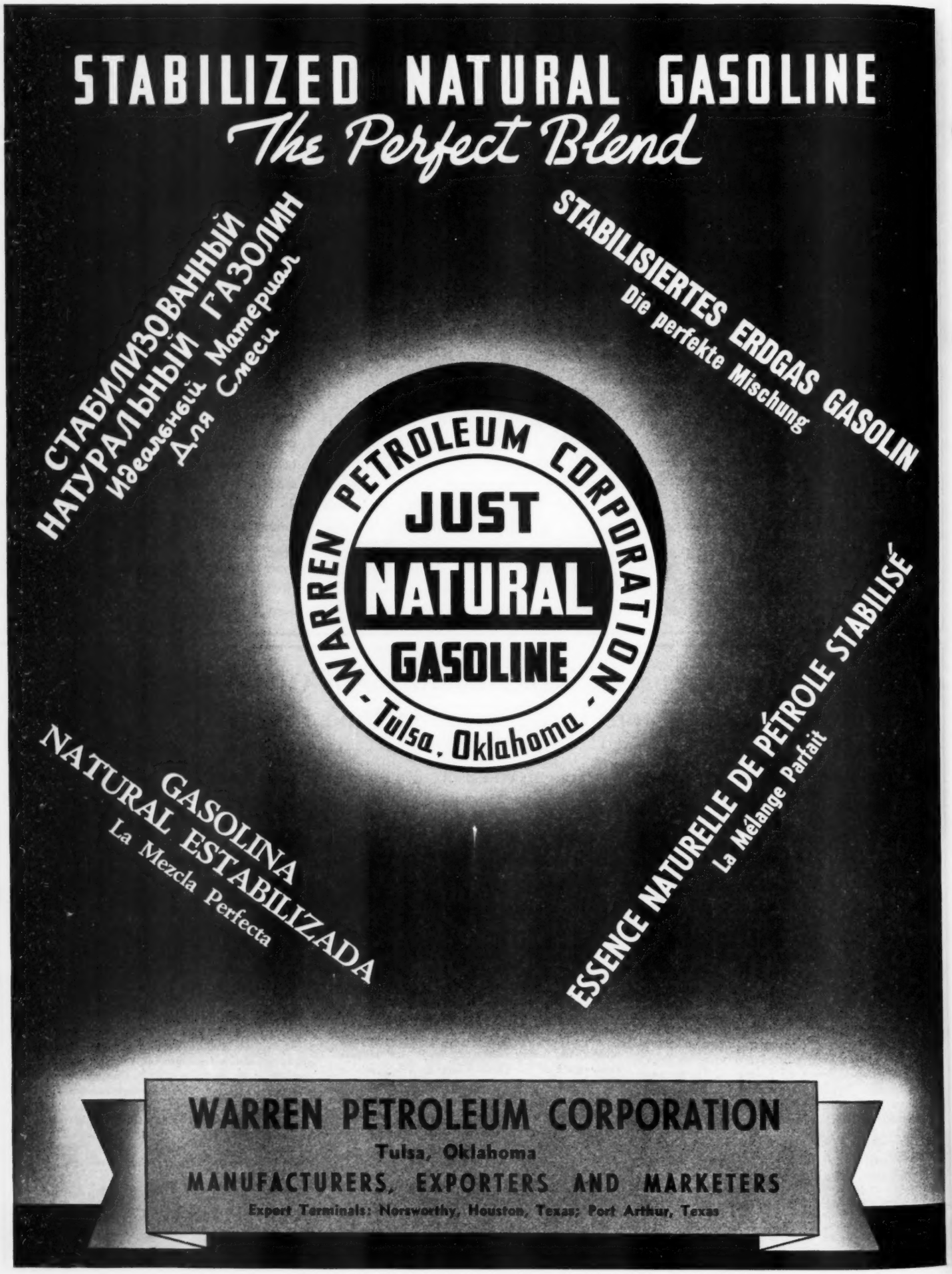
Demandez notre dernier catalogue.

.... esta conexión de orificio ROBINSON de Tipo E suprime el antiguo tipo de derivación con sus 40 pies de tubería y todas sus válvulas, conexiones y gastos de instalación. No ocupa más espacio que una válvula ordinaria.

So requieren sólo unos pocos minutos para cambiar la placa del orificio, sin interrumpir la corriente. La facilidad con que se cambian las placas promueve frecuente inspección y una gran precisión en la medición. No hay ninguna válvula expuesta a escape. Todos los gases o líquidos tienen que pasar a través de la conexión de orificio. Se ofrecen en diversos tamaños para todas las presiones de trabajo.

Pídanos nuestro más reciente catálogo.

ROBINSON ORIFICE FITTING CO., INC.
1435 Santa Fe Ave., Los Angeles, California, U.S.A.


STABILIZED NATURAL GASOLINE
The Perfect Blend
СТАБИЛИЗОВАННЫЙ НАТУРАЛЬНЫЙ ГАЗОЛИН
Идеальный Материал Для Смеси
STABILISIERTES ERDGAS GASOLIN
Die perfekte Mischung
WARREN PETROLEUM CORPORATION
JUST NATURAL GASOLINE
Tulsa, Oklahoma
GASOLINA NATURAL ESTABILIZADA
La Mezcla Perfecta
ESSENCE NATURELLE DE PÉTROLE STABILISÉ
La Mélange Parfait
WARREN PETROLEUM CORPORATION
Tulsa, Oklahoma
MANUFACTURERS, EXPORTERS AND MARKETERS
Export Terminals: Norsworthy, Houston, Texas; Port Arthur, Texas

Steel-Pipes

more than 318 mm (12,5 in) o. Dia.

● *Seamless* ●

Watergas lapwelded ● *Electrically welded*

Tubos de acero

de más de 318 mm de d. e.

Sin soldadura

Soldados a solapa con gas de agua
Soldados electricamente

Tuyaux en acier

de plus de 318 mm de d. e.

Sans soudure

Soudés au gaz à l'eau par recouvrement
Soudés électriquement

Long-distance gas mains for the Ruhrgas A.-G. Essen, 20" to 32" bore, 9/32" to 23/64" shell.

Tubería de gas à gran distancia de la S.A. Ruhrgas Essen, de 500 a 800 m/m de d. i. y 7 m/m a 9 m/m de espesor de pared.

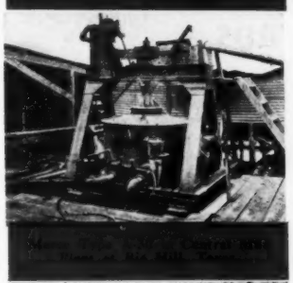
Conduite de gaz à longue distance de la Ruhrgas A.-G. Essen, de 500 à 800 m/m de d.i. et 7 à 9 m/m d'épaisseur de paroi.

Grossrohr-Verband

Düsseldorf, Bismarckstr 44/46

ADS

EXTRA SAFETY TO DEEP DRILLING

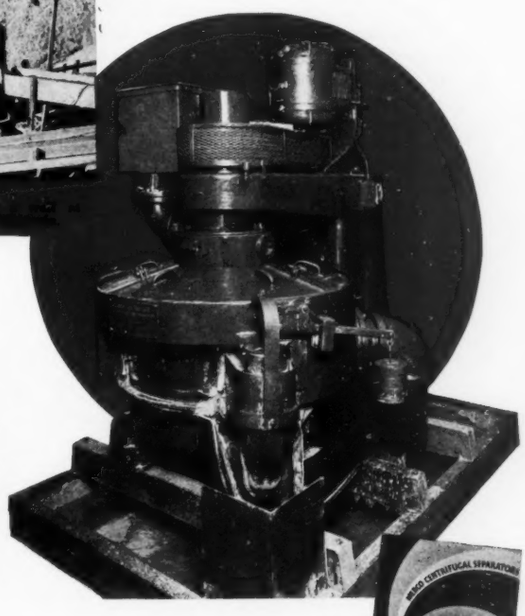


Scientific weighted muds and drilling fluids have become a recognized necessity for deep drilling. And the Merco Centrifugal Separator is equally necessary as it provides a fast and continuous method of reconditioning weighted muds. It desands continuously. It reconcentrates mud that has become too light. It removes abrasive cuttings which cannot be removed in any other way. A Merco can reclaim weighting material for use on another well. Merco centrifuging is the practical way of gaining extra safety and economy.

See Page 1397 of 1938 Composite Catalog.

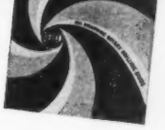
Les boues lestées et fluides de forage scientifiques sont devenus une nécessité admise en forage profond. Et le Séparateur Centrifuge Merco est tout aussi nécessaire car il offre une méthode rapide et continue pour rénover les boues lestées. Il dessable continuellement. Il reconcentre la boue qui est devenue trop fluide. Il extrait les débris abrasifs qu'on ne peut éliminer d'aucune autre manière. Un Merco peut récupérer du matériel de lestage pour emploi sur un autre puits. Le centrifugeage Merco est le moyen pratique de gagner en sécurité et en économie.

Los lodos y líquidos de perforación científicamente cargados se han convertido en una necesidad imprescindible para la perforación a gran profundidad. Y el separador centrífugo Merco es igualmente necesario, a causa de que provee un rápido método contínuo de reacondicionar o rehabilitar los lodos cargados. Desarena en forma contínua. Reconcentra el lodo que se ha hecho demasiado liviano. Quita todas las partículas raspantes que no pueden ser separadas de otra manera. Un Merco puede recuperar el material de carga para ser utilizado en otro pozo. El separador centrífugo Merco es la manera práctica de ontener adicional seguridad y economía.



ADVANTAGES

Desands continuously.
Reconcentrates to initial weight.
Reduces drilling hazards.
Protects equipment from abrasion.
Saves weight materials.
Helps prevent stuck-pipe, twist-offs, etc.
CONTINUOUS, AUTOMATIC, SIMPLE.



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CENTRIFUGAL SEPARATOR CO.

Subsidiary of

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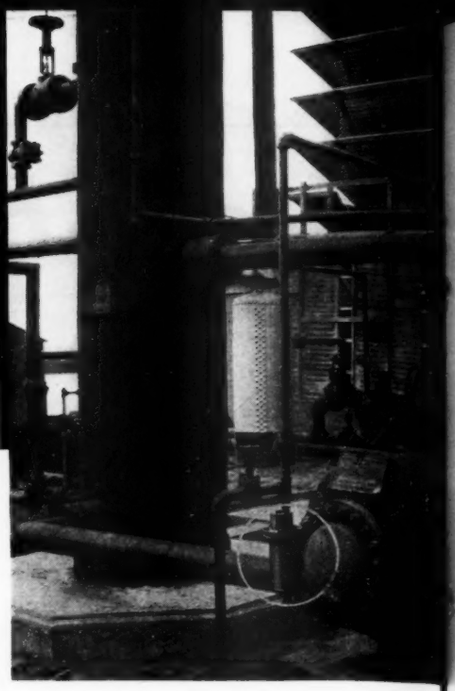
343 Sansome St., San Francisco, California

Distributors: W. K. M. CO., for Texas, Mid-Continent and export. PETROLEUM EQUIPMENT CO., for California



From left to right these pictures show Armstrong traps draining (1) a gas well separator, (2) a steam separator on a drilling rig, (3) the steam coil in a reboiler.

De izquierda a derecha, estas vistas muestran colectores Armstrong instalados en (1) un separador de gas de pozo, (2) un separador de vapor en un aparejo de perforación, (3) en el serpentín de vapor de una caldera de recalentamiento.

De gauche à droite ces photos montrent des collecteurs Armstrong au drainage (1) un séparateur de puits de gaz, (2) un séparateur de vapeur sur un appareillage de forage, (3) le serpentin de vapeur d'une chaudière à rechauffe.

Steam and Gas Traps for Every Purpose

As suggested by the above pictures, Armstrong Traps are used in all branches of the oil industry. This wide acceptance is very largely due to their dependable performance. Without exception, all Armstrong traps are fully guaranteed for quality and each user is guaranteed complete satisfaction. Armstrong representatives are located in principal centers throughout the world with many sizes of traps in stock for immediate use. The table below lists the most common sizes. Traps for higher pressures are listed in our catalog and manual illustrated below—copies of which will be sent free on request.

Colectores de vapor y de gas para todo servicio

Así como lo sugieren las fotografías de arriba, los colectores Armstrong se emplean en todas las ramificaciones de la industria del petróleo. Esta gran aceptación se debe principalmente a su seguro functionamiento. Sin excepción alguna, todos los colectores Armstrong llevan nuestra garantía de superior calidad y cada comprador queda así seguro de quedar completamente satisfecho. Los representantes de la Armstrong, en las principales ciudades del mundo, tienen en existencia diversos tamaños de nuestros colectores, para inmediata entrega a los compradores. La tabla de abajo contiene los tamaños más populares. Los colectores de mayores presiones se describen en nuestro catálogo y manual, ilustrado abajo, y gustosamente enviaremos ejemplares a quien se sirva solicitarlos.

Collecteurs à vapeur et à gaz pour tous usages

Ainsi que le suggèrent les photos ci-dessus, les collecteurs Armstrong s'emploient dans toutes les branches de l'industrie du pétrole. Cet accueil général est dû en grande partie à leur régularité de fonctionnement. Sans exception, tous les collecteurs Armstrong sont garantis sans réserve pour la qualité et une satisfaction entière est garantie à chaque usager. On trouve des représentants Armstrong dans les principaux centres du monde entier avec de nombreuses grandeurs de collecteurs en stock pour emploi immédiat. La table ci-dessous donne la liste des grandeurs les plus courantes. Des collecteurs pour plus fortes pressions sont énumérés dans notre catalogue et manuel illustré ci-dessous—dont nous fournirons des exemplaires à titre gracieux sur demande.

ARMSTRONG MACHINE WORKS

868 Maple Street
Three Rivers, Mich., U. S. A.

Cable Address:
"Armtrap Three Rivers Michigan"
Bentley's Code

Trap Size / Tamaño de la Trampa / Grandeur de collecteur		200	201	211	212	213	214	215	216	313	315	316
Pipe connections / Conexiones para las Tuberías / Raccords de tuyau		½" - ¾"	½" - ¾"	½"	½" - ¾"	½" - ¾"	1"	1" - 1¼"	1½" - 2"	½" - ¾"	1" - 1¼"	1½" - 2"
List prices / Precio de Catálogo, Trampa Standard / Prix de tarif		$7.00	$7.00	$9.25	$15.00	$20.75	$29.00	$38.00	$55.00	$50.00	$80.00	$150.00
Telegraph code / Palabra Telegráfica / Code télégraphique		Acacia	Acanthus	Aspen	Birch	Walnut	Hemlock	Larch	Tamaruck	Barium	Bismuth	Boron
Height / Altura / Hauteur		4 1/8"	5 1/8"	6 1/8"	8"	10 1/4"	12 1/2"	14"	16 3/4"	10 5/8"	14 1/4"	16 1/2"
Diameter / Diámetro / Diamètre		4 1/4"	3 1/4"	4 1/2"	5"	6 5/8"	7 1/2"	8 1/2"	10 7/8"	8"	9 3/4"	11 7/8"
Weight / Peso / Poids		4 lbs.	4 lbs.	5 1/2 lbs.	10 1/2 lbs.	19 lbs.	32 lbs.	47 lbs.	76 lbs.	47 lbs.	92 lbs.	160 lbs.
Max. Press, lbs. sq. in. / Presión Máxima, Lbs. / Press. max., lbs. pouce carré		125	125	200	200	250	250	250	250	600	600	600
Continuous Discharge capacity in Lbs. of water per hour at pressures indicated in Lbs. per sq. in. / Capacidad de descarga continua en lbs. de agua por hora a las presiones indicadas. Lbs. de Presión. / Débit en lbs. de décharge continue d'eau par heure aux pressions indiquées exprimé en lbs. par pouce carré.	5 lbs.	450	450	840	1560	3000	4600	7,600	14,300	----	----	----
	10	560	560	1000	1900	3500	5600	9,100	17,200	----	----	----
	15	640	640	1080	2060	3900	6300	10,000	19,000	----	----	----
	20	690	690	890	1800	3100	5900	8,500	18,200	----	----	----
	25	460	460	940	1940	3390	6300	9,200	20,000	----	----	----
	30	500	500	970	2050	3600	6600	9,800	17,600	----	----	----
	40	550	550	780	1700	3450	5700	8,400	20,000	----	----	----
	50	600	600	840	1840	3750	6200	8,900	18,200	----	----	----
	60	635	635	900	1950	4050	6600	9,300	19,600	----	----	----
	70	660	660	940	2030	3700	6100	9,200	18,500	----	----	----
	80	690	690	800	1650	3920	6400	9,700	19,800	----	----	----
	90	640	640	840	1750	3220	6100	10,100	18,000	----	----	----
	100	650	650	880	1840	3400	6300	10,400	18,500	----	----	----
	125	660	660	960	2040	3880	6700	10,900	20,400	----	----	----
	150	----	----	820	1530	3500	5900	9,500	18,600	----	----	----
	200	----	----	900	1680	3200	5400	9,500	17,400	----	----	----
	250	----	----	----	----	3500	5700	10,200	19,000	----	----	----
	300	----	----	----	----	----	----	----	----	2600	5000	10,000
	400	----	----	----	----	----	----	----	----	2800	3800	8,000
	500	----	----	----	----	----	----	----	----	2400	4200	8,000
	600	----	----	----	----	----	----	----	----	2500	3000	8,400

phragm sampler. The water in the small reservoir above the diaphragm creates sufficient pressure on the rubber sack to squeeze all fluid out of it into the sealed sampler.

This automatic sampler may be regulated so that samples are taken at regular intervals. The period for taking samples can also be regulated. The individual samples are mixed in a sealed sample-can and when removed from under the sampling device this container can be rotated so that the samples are thoroughly mixed.

BARGE FOR BURYING PIPE IN MUD

Along the coast of Louisiana and Texas there are many marshes and bodies of inland water crossed by pipe lines. In some of these coastal waters oysters and fish are propagated. If the water is muddied the oysters will not thrive and it is therefore necessary for the pipe line companies to devise means of laying pipe without stirring up the mud.

One company has had a special barge built to accomplish this result. This barge is provided with a plunger or jack in the rear of the barge, held in place by four steel braces in such a position as to permit it to be raised or lowered as necessary. On the bottom of the jack shaft is fitted a curved section of padded pipe to engage the top of the pipe to be laid. The pipe is coated, wrapped and welded into 80-foot sections in the usual manner at a nearby pipe assembly yard and then hauled to the barge location. These 80-foot sections are welded into the line and then lowered to the surface of the mud to be crossed.

It has been found of advantage to bury this pipe in the mud, but if a ditch is dug for this purpose the water is so muddied as to injure the oysters. So instead of digging a ditch, the pipe is pushed into the mud by the jack mounted on the barge. As the pipe is pushed down the barge is pulled forward by two steel cables tied to two 150-pound anchors several feet in front of the barge. The pipe is held in position in the front end of the barge by a lighter jack, and the rear end of the barge is held in place by two small anchors.

In sections where hard surface is encountered and it is impossible to push the pipe down into the mud without breaking the coating, two steam jets are hung on the bottom side of the pipe and as the pressure is applied the pipe is pushed down to any desired depth. As the pipe begins to settle the jets are pulled forward by two cables until the hard-surface section has been passed.

This method of laying pipe through such water areas has proven quite effective and has solved the problem of protecting the oysters and fish. Pipe lines laid by this method have varied in diameter from 6 to 12 inches and in length from a few hundred feet to several miles. The jack is steam-actuated and the boiler usually is mounted upon a second barge anchored close to the barge carrying the jacks.

GASOLINE PIPE LINE SYSTEM

There are many gasoline lines delivering motor fuel from refinery to distributing centers. A new pipe line was laid recently from the East Texas field to a refinery located at Baytown, Tex. This 8-inch pipe line, approximately 300 miles long, is used to transport casinghead gasoline, butane and propane produced in East Texas to the new stabilization unit at the refinery. The lighter fractions are used as charging stock for a polymerization plant.

(Continued on Page 289)

crée une pression suffisante sur le sac en caoutchouc pour en exprimer tout le liquide qui s'écoule dans l'echantillonneur scellé.

On peut régler cet échantillonneur automatique de maniére à ce qu'on prélève des échantillons à des intervalles réguliers. On peut aussi régler la péroide de prélèvement des échantillons. On mélange les échantillons individuels dans un bidon d'échantillonnage scellé, et quand on le sort de dessous le dispositif échantillonneur on peut faire tourner ce bidon de manière à ce que les échantillons soient mélangés intimement.

CHALAND POUR ETERRER LES TUYAUX DANS LA BOUE

Le long de la côte de la Louisiane et du Texas il y de nombreux marais et pièces d'eau intérieures traversées par des pipe-lines. Dans certaines de ces eaux costales on fait l'élevage des huîtres et des poissons. Or si l'eau est boueuse les huîtres ne fructifient pas, d'où la nécessité pour les compagnies de pipe-lines d'imaginer des moyens de poser les tuyaux sans agiter la boue.

A cette fin une compagnie a fait construire un chaland spécial. Ce chaland est muni d'un plongeur ou cric à l'arrière du chaland, tenu en place au moyen de quatre étais en acier disposés de manière à ce qu'on puisse le monter ou le descendre dans la mesure nécessaire. A la base de l'arbre du cric est fixée une section recourbée de tuyau rembourré qui doit s'engager avec le haut du tuyau à poser. On enduit, on revêt et on soude le tuyau en sections de 80 pieds de la manière habituelle dans un chantier proche de montage de tuyaux, puis on l'amène à l'endroit du chaland. On soude alors ces sections de 80 pieds dans la canalisation et on les descend à la surface de la boue qu'il s'agit de traverser.

On a trouvé intérêt d'enterrer ce tuyau dans la boue, mais si on creuse un fossé à cette fin l'eau devient si boueuse qu'on risque de nuire aux huîtres. Par suite, au lieu de creuser un fossé, on pousse le tuyau dans la boue au moyen du cric plongeur monté sur le chaland. Tandis qu'on pousse le tuyau vers le bas on tire le chaland vers l'avant au deux câbles en acier fixés à deux ancres de 150 lbs. situées à plusieurs pieds en avant du chaland. Le tuyau est tenu en place à l'extrémité avant du chaland au moyen d'un cric plus léger, et l'extrémité arrière du chaland est tenu en place par deux petites ancres.

Dans les endroits où on se heurte à des surfaces dures et où il est impossible de pousser le tuyau dans la boue sans briser le revêtement, on suspend deux jets de vapeur sur le côté de base du tuyau et tandis qu'on applique la pression on pousse le tuyau jusqu'à la profondeur désirée. Quand le tuyau commence à se poser on tire les jets vers l'avant au moyen des deux câbles jusqu'à ce qu'on ait passé la section de surface dure.

Cette méthode de pose des tuyaux à travers ces régions de marais s'est montrée très satisfaisante et a résolu le problème de la protection des huîtres et du poisson. Les pipe-lines posés par cette méthode ont varié en diamètre de 6 à 12 pouces et en longueur depuis quelques centaines de pieds à plusieurs kilomètres. Le cric plongeur marche à la vapeur et la chaudière est en général montée sur un deuxième chaland ancré tout près du chaland qui porte les crics.

RESEAU DE PIPE-LINES A ESSENCE

Il y a de nombreuses canalisations à essence qui amènent le carburant à moteur de la raffinerie aux centres de distribution. Un pipe-line d'un nouveau type a été récemment posé entre le champ pétrolier du Texas Est et une raffinerie située à Baytown, Tex. Ce pipe-line de 8 pouces, d'environ 300 milles de longueur, sert au transport de l'essence de gaz naturel, du butane et du propane produits en Texas Est jusqu'à la nouvelle installation de stabilisation dans la raffinerie. Les fractions les plus volatiles sont utilisées comme matière de chargement pour une installation de polymérisation.

Ce réseau est en partie un ancien pipe-line à pétrole brut transformé et en partie de la nouvelle tuyauterie. Toute la canalisation est parallèle à un tuyautage à pétrole brut.

Avant de mettre le réseau en service on avait

(Continué sur Page 289)

fragma crea una presión suficiente, sobre el saco de caucho, para exprimir de el todo el líquido, que cae en el recipiente cerrado.

Este sacador automático de muestras puede ser regulado de modo que saque muestras a intervalos reguladores. También se puede regular el período de sacar muestras. Todas las muestras individuales se mezclan en un lata de muestras cerrada, la cual, una vez quitada de la parte inferior del aparato de tomar muestras, puede girarse, a fin de que todas estas muestras queden muy bien mezcladas.

LANCHON PARA ENTERRAR TUBERIA EN EL LODO

A lo largo de la costa de Luisiana y Texas hay muchos pantanos y extensiones de agua tierra adentro, atravesados por tuberías u oleoductos. En algunas de estas aguas costaneras hay criaderos de ostras y sitios para la propagación de peces. Al enturbiarse el agua, las ostras no se propagan, y por esta razón las compañías de oleoductos se han visto obligadas a idear medios de tender la tubería sin agitar el lodo.

Una compañía ha construído un lanchón especial para hacer este trabajo. El lanchón lleva atrás un buzo o gato, asegurado por cuatro tirantes de acero, que lo mantienen en una posición que permite subirlo o bajarlo, cuando sea necesario. En el fondo del eje intermedio hay una sección curva de tubo forrado, para sujetar el extremo superior del tubo por tenderse. El tubo se reviste, envuelve y solda, en secciones de 80 pies de longitud, de la manera corriente, en taller de armadura de tubería cercano, y se transporta al punto en que está el lanchón. Estas secciones de 80 pies se unen a la tubería, por soldadura, y se bajan a la superficie del lodo por cruzarse.

Se ha visto que es ventajoso enterrar esta tubería en el lodo, pues si se excavara una zanja para este mismo objeto, el agua se enturbiaría tanto que dañaría a los criaderos de ostras. En lugar de excavar una zanja, la tubería se entierra en el lodo, con la ayuda del gato instalado en el lanchón. Mientras la tubería va bajando, el lanchón se empuja hacia el frente, mediante dos cables de acero atados a dos anclas de 150 libras, colocadas varios pies adelante del lanchón. La tubería se sujeta en posición, en el extremo delantero del lanchón, por un gato más liviano, y el extremo trasero del lanchón queda sujeto por dos anclas pequeñas.

En lugares donde se presenta una superficie dura y es imposible enterrar la tubería en el lodo, sine romperle el revestimiento, se cuelgan del lado inferior de la tubería dos surtidores de vapor. Al aplicarse el chorro de vapor, la tubería puede enterrarse a la profundidad que se desee. Cuando la tubería empieza a estabilizarse, los surtidores se corren hacia adelante, con la ayuda de dos cables.

Este método de tender la tubería en semejantes regiones, ha dado resultados satisfactorios y resuelto el problema de proteger la vida acuática. Las tuberías u oleoductos tendidos de esta manera han variado en diámetro de 6 a 12 pulgadas y tenido longitudes de unos pocos centenares de pies hasta varios millares de millas. El gato funciona con vapor y la caldera va generalmente instalada en un segundo lanchón, que se coloca en la proximidad del lanchón provisto de gatos.

SISTEMA DE TUBERIA CONDUCTORA DE GASOLINA

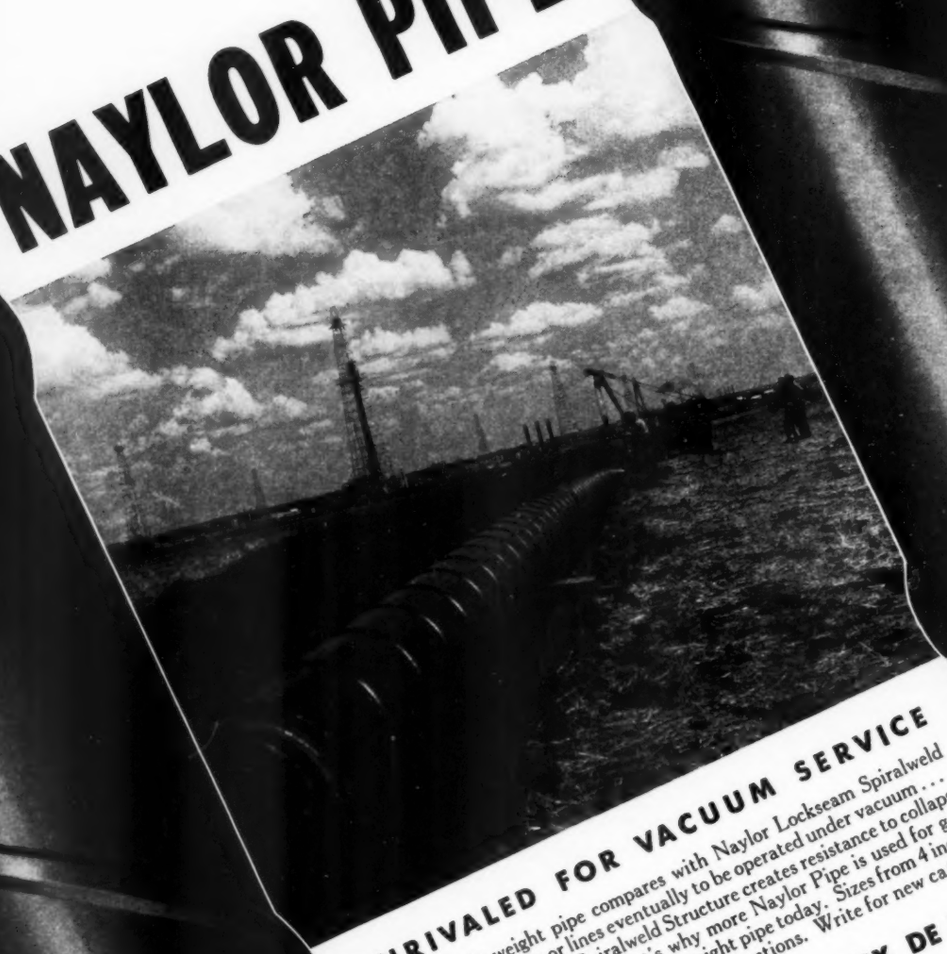
Hay muchas tuberías conductoras de gasolina que entregan este combustible de motor directamente de la refinería a los centros de distribución. Recientemente se tendió un nuevo tipo de tubería conductora, entre un campo en East Texas y una refinería situada en Baytown, Texas. Esta tubería de 8 pulgadas de diámetro y como de 300 millas de longitud, se emplea para la conducción de esencia de gas natural, butano y propano, producidos en East Texas, a la nueva unidad de estabilización instalada en la refinería. Las fracciones más volátiles se emplean como material de carga en la planta de polimerización.

Este sistema es en parte un antigua tubería conductora de petróleo crudo reformada y en parte una tubería nueva. La línea completa corre paralela a un oleoducto.

Antes de entrar en servicio, la tubería fué sometida a completa limpieza, cirlando por ella, con la

(Continué en Página 289)

NAYLOR PIPE



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No other light-weight pipe compares with Naylor Lockseam Spiralweld Pipe for vacuum lines or lines eventually to be operated under vacuum.... The exclusive Lockseam Spiralweld Structure creates resistance to collapse unrivaled in the field .... That's why more Naylor Pipe is used for gas-gathering lines than any other light-weight pipe today. Sizes from 4 inches to 30 inches in diameter. All types of connections. Write for new catalog

SANS PAREIL POUR LES TRAVAUX DE VIDE

Aucun autre tuyau est comparable à la conduite type Naylor, soudée en spirale et à couture serrée, pour l'usage dans les lignes de vide ou bien dans les lignes qui seront éventuellement employées sous l'action aspirante.... Le système exclusif de construction qui incorpore la soudure en spirale et une couture serrée, leur donne une résistance à l'effondrement qui n'est pas atteinte ailleurs .... C'est pour cette raison que les conduites type Naylor sont aujourd'hui employées plus fréquemment dans les lignes collectrices du gaz que tout autre tuyau léger. Diamètres de 4 à 30 pouces. Raccords de tout type. Demandez notre dernier catalogue.

SIN RIVAL PARA SERVICIO DE VACÍO

Ningún otro tubo ligero se puede comparar con el tubo Naylor de juntura firme soldada en espiral para líneas de vacío o para líneas que se emplearán eventualmente como líneas de vacío. La construcción exclusiva de juntura firme soldada en espiral cree una resistencia a hundimiento sin rival en este ramo. Por esto el tubo Naylor se emplea hoy para líneas de recoger gas más que todos los otros tubos ligeros. Diámetros desde 4 pulgadas hasta 30 pulgadas. Conexiones de todos tipos. Pídase el nuevo catálogo.

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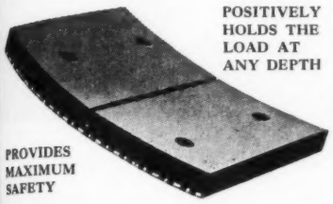
GRIZZLY FULL-MOLDED ROTARY BRAKE BLOCKS



Unquestionably the finest brake block lining ever developed for oil field service—a high quality block that holds the load easier at any depth. Non-scoring; it feeds off smoother; smooths the rims; eliminates brake and drum troubles; speeds up drilling operations; . . . and gives more ton miles of service under all operating conditions. Made of selected asbestos, with special binders that act as a lubricant, positively preventing any smoking or dusting. Contains no rubber, cotton or other materials that are affected by heat. Compressed under 500 tons hydraulic pressure, blocks retain their density until completely worn out and will withstand 2000° heat without showing any signs of disintegrating. Blocks are supplied in sets for individual drawworks; for well pulling machines and winches.

Write for Catalog No. 11-OF.

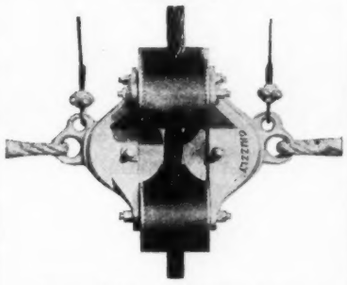
Sans conteste, la meilleure garniture de segment de frein qui ait jamais encore été réalisée pour service de champ pétrolier—un segment de haute qualité qui tient plus facilement la charge à toute profondeur. Non-rayant; il se dégage avec plus de douceur; égalise les bords; supprime les ennuis de freins et de tambours; active les opérations de forage; . . . et assure davantage de tonnes-milles de service dans toutes les conditions d'emploi. En amiante de choix, avec des liants spéciaux qui agissent comme un lubréfiant, empêchant d'une manière positive toute production de fumée ou de poussière. Il ne contient ni caoutchouc, ni coton, ni autre substance qui soit affectée par la chaleur. Comprimés sous une pression hydraulique de 500 tonnes, ces segments conservent leur densité jusqu'à usure complète et peuvent résister à une chaleur de 2000° sans montrer de trace de désagrégation. Ces segments sont fournis en jeux pour groupes de traction individuels, pour machines à tirer les puits et treuils.

Catalogue No. 11-OF sur demande.

Incuestionablemente, el mejor forro en bloque para freno que se ha ideado para servicio en campos petrolíferos. Es un material de superior calidad, que sujeta la carga con mayor facilidad a cualquier profundidad. No raya; funciona con mayor suavidad; suaviza las llantas; evita irregularidades en el freno y el tambor; acelera el trabajo de perforación . . . y rinde más toneladas y millas de servicio bajo toda condición de operación. Se hace de asbesto escogido, con ligamientos especiales, que actúan como un lubricante, que positivamente evitan la humareda o levantamiento de polvo. No contiene caucho, algodón u otro material que pueda afectarse por el calor. Comprimidos bajo una presión hidráulica de 500 toneladas, estos bloques retienen su densidad hasta que se desgastan por completo y pueden resistir una temperatura de 2000 grados F. sin mostrar indicio alguno de disgregación. Estos forros en bloque se suministran en juegos completos para máquinas de tracción individuales, y también para máquinas de tiro de pozos y montacargas.

Pídanos el catálogo No. 11-OF.

GRIZZLY "NO-WIP" LINE SAVER



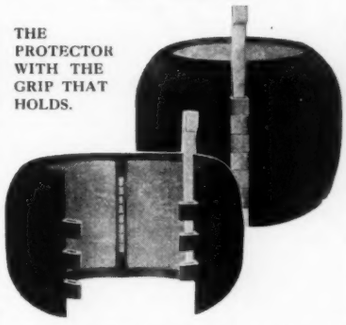
Saves Miles of Wire Lines

The most compact and efficient device ever developed to eliminate the tremendous hazards and expense resulting from excessive wire line wear. It positively eliminates *whipping* without straightening or injuring the line; forces the line to spool perfectly without crawling or overlapping; prevents piling up at any area on drum; and saves miles of valuable wire lines every year. There is no friction, stress or strain on the line, which is always protected from wear; assuring longer life and drilling more wells with the same line. A thoroughly engineered device, ruggedly constructed of the finest materials; simple; safe; light in weight; perfectly balanced; and embodies few parts. Easily installed at any point in the derrick. Will pay for itself quickly. Write for Bulletin No. 10-OF.

Le dispositif le plus compact et le plus efficace à ce jour pour éliminer les énormes risques et frais dûs à une usure de câbles excessive. Il supprime positivement le *fouettement* sans redresser ou abîmer le câble; force le câble à s'embobiner parfaitement sans glissement ou chevauchement; rend l'empilage impossible en aucun point du tambour; et économise des milles de câble précieux chaque année. Il n'y a ni friction, ni effort, ni fatigue sur le câble qui est toujours à l'abri de l'usure, d'où plus longue vie utile et forage de plus de puits avec le même câble. Un dispositif bien au point, robuste, de matériel surchoix, simple, sûr, léger, d'équilibre parfait, et qui n'a que quelques pièces. Facile à installer en tout point de la tour de sondage. Amortit son prix d'achat à brève échéance. Bulletin No. 10-OF sur demande.

El dispositivo más compacto y eficaz de todos los perfeccionados hasta ahora para evitar los grandes peligros y gastos que resultan del desgaste excesivo de los cables metálicos. Positivamente suprime el "batimiento" sin estirar o dañar el cable; obliga al cable a pasar perfectamente por el carrete, sin arrastramiento ni solapadura; evita el amontonamiento en cualquier punto del tambor y ahorra millas de valiosos cables anualmente. No hay rozamiento, tensión o presión sobre el cable, el cual está siempre protegido contra el desgaste. Seguridad de mayor duración de los cables y perforación de más pozos con el mismo cable. Un dispositivo muy bien proyectado, firmemente construído de los mejores materiales; sencillo, seguro, liviano en peso; perfectamente equilibrado y con muy pocas piezas. Se instala con facilidad en cualquier punto de la torre de taladrar. Muy pronto se paga por sí mismo. Pídanos el boletín No. 10-OF.

GRIZZLY GIANT— *The Streamlined* DRILL PIPE PROTECTOR



Grizzly Giant Protectors provide the best protection available for drill pipe and casing; assuring maximum economy, long life and serviceability. Extra large rubber body, moulded in one solid piece in curved form to fit exact contour of the pipe. The one-piece, hinged design permits installation on pipe in a manner that eliminates any expansion strain on the rubber. The hinged back and tapered key locking device provide a tremendous grip that positively prevents moving from position where it is locked on pipe, yet it can be installed by your regular crew in just a few seconds by merely tapping the key into locked position in the tapered slots. No special tools are required and just as easily removed. Made from the finest, toughest rubber, in all standard drill pipe sizes. For detailed information write for Bulletin No. 9-OF.

Les protecteurs Giant Grizzly assurent la meilleure protection possible pour tuyau de foret et revêtement, donnant à la fois économie maximum, longue vie utile et extra-utilité. Corps de caoutchouc extra-grand, moulé en une seule pièce de forme courbée afin de s'adapter exactement au contour du tuyau. Le tracé d'une seule pièce, articulé, en permet la pose sur tuyau d'une manière qui supprime tout effort d'extension sur le caoutchouc. Le dispositif de blocage à dos articulé et clavette amincie assure une énorme adhérence qui rend impossible tout déplacement de la position une fois qu'a eu lieu le blocage sur le tuyau, et pourtant la pose peut en être faite par votre équipe habituelle en quelques secondes, et cela en enfonçant par petits coups la clavette dans la position de blocage dans les rainures coniques. Il n'y a pas besoin d'outils spéciaux et le démontage en est tout aussi simple. Fabriqués à partir du meilleur et du plus tenace caoutchouc, dans toutes les tailles standard de tuyau de foret. Pour données complètes, demander le Bulletin No. 9-OF.

Los protectores Grizzly Giant proveen la mejor protección que existe hoy día para la tubería de perforación y revestimiento. Aseguran economía máxima, gran duración y utilidad práctica. Cuerpo bien grande de caucho, moldeado en una sola pieza maciza, en forma curva, para adaptarse exactemente al contorno del tubo. El tipo enterizo y articulado permite la instalación en el tubo de una manera que elimina toda fuerza de extensión sobre el caucho. El respaldo articulado y el dispositivo de cierre de pasador cónico aseguran una enorme fuerza de retención o sujeción, que positivamente evita que pueda moverse de la posición en que está cerrado alrededor del tubo; sin embargo, puede este protector ser instalado por los mismos trabajadores corrientes, en pocos segundos, sencillamente introduciendo el cierre de pasador cónico por las ranuras correspondientes. No hay necesidad de herramientas especiales, para su instalación o desprendimiento. Estos protectores se hacen de caucho fino de gran resistencia y se ofrecen en todos los tamaños corrientes de tubo de perforación. Para información detallada, pídanos el boletín No. 9-OF.

GRIZZLY ROTARY HOSE

Grizzly Powerflex—10,000 Lb. Test
Grizzly Red Line Cub—7,500 Lb. Test
Grizzly Cub—5,000 Lb. Test

Two factors are vitally essential in rotary hose for modern deep well drilling operations; 1—FEXIBILITY, such as that obtained by our exclusive Grizzly construction; and 2—STRENGTH sufficient to withstand the high pressures of any emergencies that may be encountered.

In addition to its outstanding flexibility, Grizzly Hose embodies 50% greater strength than any other rotary hose manufactured, and will withstand abnormal pressures and abuse.

Grizzly is the finest, toughest, strongest, and yet the most flexible rotary hose ever produced. Its extraordinary strength and flexibility are obtained by the exclusive method of fabrication, plus materials of the highest quality—plus twenty years of experience in the manufacture of rotary hose. It has proved its superiority by drilling to completion many of the deepest wells in the toughest oil fields in the world.

Write for Bulletin No. 13-OF.

Deux facteurs sont d'une importance capitale en flexible rotatif pour les opérations modernes de forage de puits profonds; 1—SOUPLESSE, telle que celle réalisée par notre construction Grizzly exclusive; et 2—FORCE suffisante pour résister aux hautes pressions résultant de toute condition imprévue qui peut se présenter.

En plus de sa souplesse remarquable, le flexible Grizzly possède 50% de plus de force que tout autre flexible rotatif sur le marché, et est à mesure de résister à des pressions anormales et un usage dur.

Grizzly est le meilleur, le plus tenace, le plus fort, et pourtant le plus souple des flexibles rotatifs produits à ce jour. Sa résistance et sa souplesse extraordinaires sont réalisées grâce à la méthode exclusive de fabrication, jointe à la plus haute qualité de matériel—sans oublier une expérience de 20 ans dans la fabrication de flexible rotatif. Il a donné des preuves de sa supériorité dans le forage intégral d'un grand nombre des puits les plus profonds creusés dans les champs de pétrole les plus difficiles au monde.

Bulletin No. 13-OF sur demande.

Dos factores son esencialmente necesarios en materia de manguera de rotativa para los trabajos de perforación de pozos a grandes profundidades, de acuerdo con los métodos modernos: 1—FLEXIBILIDAD, como la que se obtiene mediante la exclusiva construcción del producto Grizzly, y 2—FIRMEZA suficiente para resistir las grandes presiones que inesperadamente puedan presentarse en la operación.

En adición a su sobresaliente flexibilidad, la manguera Grizzly es 50% más firme y resistente que toda otra manguera de rotativa del mercado y puede resistir muy bien presiones anormales y maltrato en general.

La Grizzly, a pesar de su extraordinaria firmeza, resistencia y duración, es la manguera más fina y más flexible de todas las fabricadas actualmente para rotativas. Su sorprendente firmeza y flexibilidad se deben al exclusivo método de fabricación, en combinación con materiales de la más fina calidad y veinte años de experiencia en la manufactura de mangueras para rotativas. Esta admirable manguera ha demostrado su superioridad en la perforación completa de muchos pozos de gran profundidad, en los campos petrolíferos más difíciles del mundo.

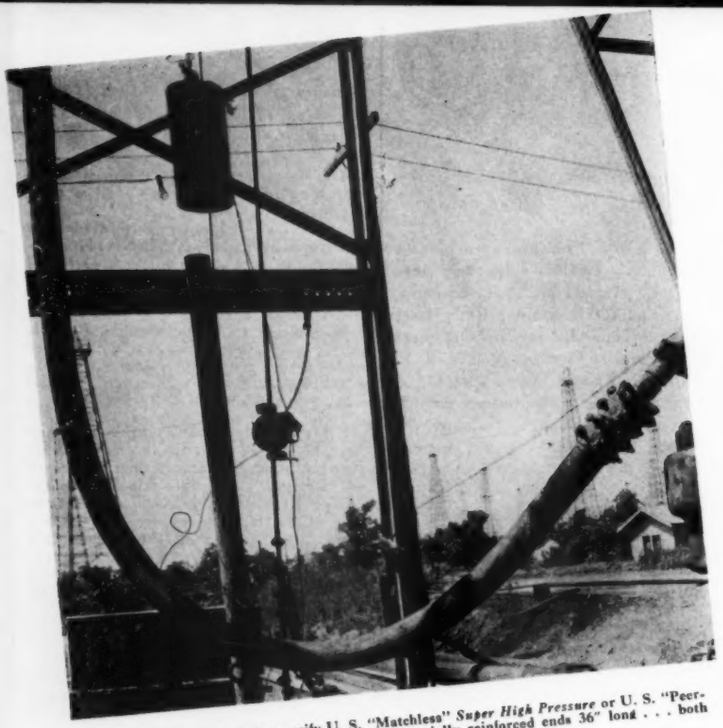
Pídanos el boletín No. 13-OF.

E. M. SMITH COMPANY

600-650 South Clarence Street, Los Angeles, California, U. S. A.

Complete Stocks Maintained In Our Warehouses At: 2311 West St., Houston, Texas. 1008 S. E. 29th St., Oklahoma City, Okla.
Export Office: Continental Emsco Co., 30 Rockefeller Plaza, New York City, N. Y. Distributed By Leading Supply Companies.

A WORLD OF HOSE REQUIREMENTS *Satisfied by* U.S.



For toughest rotary drilling, specify U. S. "Matchless" *Super High Pressure* or U. S. "Peerless" *High Pressure* Rotary Hose. Both have specially reinforced ends 36" long . . . both are flexible and built to stand the hardest oil field service.

Pour le plus dur forage rotatif, spécifier le flexible rotatif *de haute pression* U.S. "Matchless" Super ou *de haute pression* U. S. "Peerless." Tous deux ont des bouts spécialement renforcés de 36 pouces de long . . . Tous deux sont souples et prévus pour résister au plus dur service de champ de pétrole.

Para la perforación rotativa más dura, emplée la manguera rotativa de *alta presión* U. S. "Matchless" Super o la de *alta presión* U. S. "Peerless." Ambas tienen extremos especialmente reforzados de 36" de longitud . . . ambas son bien flexibles y están construídas para resistir el servicio más exigente que se presente en un campo petrolífero.

GIVING Service Beyond Price and Specifications . . . in oil fields, refineries, and terminals . . . in every country where oil is found, U. S. Rubber has steadily won worldwide acceptance for its mechanical rubber goods. Maintaining representatives and branches everywhere in the world of oil, U. S. Rubber offers a complete line of belting, hose, and packing for the specialized needs of this industry. May we send catalogs and detailed information?

Wherever there are loading or discharge operations, there you will find U. S. Amazon Combination Oil and Gasoline Suction & Discharge Hose delivering the maximum of economical service. Specify Amazon Style 3800 (rubber covered) or style 4009 (wire imbedded in rubber cover).

Partout où l'on a à faire des opérations de chargement ou de déchargement, on est sûr de trouver le flexible U.S. Amazon combinaison succion et décharge de pétrole et essence qui assure un maximum d'économie en service. Spécifier Amazon Style 3800 (caoutchouté) ou Style 4009 (fil de fer incrusté dans le revêtement caoutchouc).

Para todo servicio de carga y descarga, se verá que la manguera U. S. Amazon de combinación, para la aspiración y descarga de petróleo y gasolina, asegura lo máximo en funcionamiento económico. Especifique la Amazon, estilo 3800 (con cubierta de caucho) o el estilo 4009 (con alambre incrustado en la cubierta de caucho).

Conveying destructive blasts of superheated steam U. S. Hi-Heat Steam Hose . . . *with its special flexible metal tube, its asbestos insulation and braided wire plies* . . . gives positive protection against bursting, against sudden escape of live steam, against accidents.

Conduisant sous ses parois des jets destructifs de vapeur surchauffée, le flexible U.S. de vapeur "Hi-Heat" . . . *avec son tube métallique flexible spécial, son isolement en amiante et ses nappes en fil métallique tressé* . . . assure une protection positive contre l'éclatement, contre la fuite soudaine de vapeur vive, contre les accidents.

Conduciendo chorros destructivos de vapor sobrecalentado, la manguera de vapor U. S. "Hi-Heat" . . . *con su tubo metálico flexible especial, su aislamiento en asbesto y sus capas de alambre metálico trenzado* . . . da protección positiva contra la reventazón, contra el escape repentino de vapor caliente y contra accidentes en general.

UNITED STATES RUBBER COMPANY · US · TRADE MARK

United States Rubber Export Co., Ltd.

1790 Broadway, New York, N. Y.

This system is partly a converted old crude oil pipe line and partly new pipe. The entire line parallels a crude oil line.

Before the system was put into use the pipe line was thoroughly cleaned by pumping small batches of water, kerosene and caustic solution through it. The last batch of solution was followed with water, a scraper and 18-pound casinghead gasoline. This cleaning proved satisfactory and a minimum quantity of off-color gasoline resulted. The same equipment was used to pump the cleaning solution as ultimately was used to pump the gasoline, and the cleaning gave the line and pumping equipment a thorough test before any gasoline was moved.

At the receiving station in the East Texas field casinghead gasoline mixed with large quantities of butane and appreciable quantities of propane is received through a metering station. The product first moves into the "settling drum," a horizontal 8- by 30-foot tank installed for the purpose of removing water or other foreign matter prior to metering the fluid. Since the mixtures to be handled in this system are extremely volatile, all equipment is designed for 150 pounds working pressures. Provisions were made to maintain constant pressures on all equipment by the installation of a gas line to inject residue gas from a nearby gasoline plant. The gas in or from any particular piece of equipment is held at the desired pressure by installation of regulators, and a pressure considerably above vapor pressure of the product is carried at all times. The settling-drum is designed to operate nearly full and the level is controlled by a liquid-level regulator. Since gasoline is received into this drum at rates of several hundred barrels per hour, a vent-tank or additional overflow-tank is provided to handle the excess should some piece of equipment fail to function. An alarm signal notifies the operator of failure of any control mechanism which would cause the settling-tank to overflow. The horizintal 10- by 30-foot vent-tank has sufficient capacity to handle the stream until proper regulation can be effected. In the event it is impossible to shut off the stream causing the overflow, the vent-tank relief-valves will open and allow the stream to flow into an open flare pit where it may be burned. A still further precaution includes a regulator on the upstream side of the settling-tank which will close and shut down the incoming stream. Provision is made to empty the vent-tank by merely blowing the contents on through the system with residue gas.

Under normal conditions the product passes through the settling-tank and into the meter manifold, where it is measured by positive displacement type liquid meters which are thermostatically controlled to read in net gallons at 60° F. After leaving the meters the product moves into one of two 2,500-bbl. spherical pressure-tanks operated above the vapor pressure of the liquid at existing temperatures, but some 10 to 15 pounds less than the settling-tank pressure. The flow from the settling-tank through the meters and into the spherical tanks is controlled by a back-pressure regulator between the meters and the spheres. This regulator is operated by the liquid-level regulator on the settling-drum. The spheres are equipped with gauge columns, dial indicating thermometers, and sampling connections. Safety measures include sufficient relief-valves, bursting-heads and a separate dump-line with remote gate. The spheres also are equipped with inlet and outlet gas lines with regulators to maintain the desired pressure.

The equipment along this system is checked frequently for accuracy of meters and condition of machinery because handling this highly volatile fluid is dangerous, but it can be done if proper precautions are taken against leaks and other possible sources of danger.

(Continued on Page 294)

nettoyé le pipe-line à fond en y faisant passer par pompage de petites quantités d'eau, de pétrole et de solution caustique. On fit suivre le dernier lavage à la solution d'un courant d'eau, puis d'un racleur et d'essence de gaz naturel de 18 lbs. Ce nettoyage a donné satisfaction et on n'a obtenu qu'un minimum d'essence de teinte incorrecte. On a employé pour pomper la solution de nettoyage le même équipment que par la suite pour pomper l'essence, et ce nettoyage fournit un essai approfondi des conduites et du matériel de pompage avant d'y faire circuler aucune essence.

A la station de réception du champ pétrolier de Texas Est, l'essence de gaz naturel mélangée de fortes quantités de butane et de quantités sensibles de propane est reçue par une station de mesurage. Le produit passe tout d'abord dans le "tambour de décantation," un réservoir horizontal de 8 pieds sur 30 installé dans le but d'enlever l'eau ou autre substance étrangère avant de procéder au mesurage du liquide. Vu que les mélanges transportés dans ce réseau sont des plus volatiles, tout l'équipment employé est prévu pour des pressions de travail de 150 lbs. On a fait le nécessaire pour maintenir une pression constante sur tout le matériel en installant une conduite à gaz pour injecter du gaz résiduaire provenant d'une usine à essence à proximité. On maintient le gaz à l'intérieur ou provenant de toute pièce donnée de matériel à la pression désirée en installant des régulateurs, et on a soin de maintenir en tout temps une pression très au-dessus de la pression de vapeur du produit. Le tambour de décantation est prévu pour fonctionner presque plein et le niveau en est réglé par un régulateur de niveau liquide. Etant donné que l'essence est reçue dans ce tambour à raison de plusieurs centaines de barils à l'heure, on a prévu un réservoir de vidange ou réservoir de trop-plein supplémentaire pour recevoir tout excès pour le cas où quelque pièce du matériel viendrait à cesser de fonctionner. Un signal d'alarme avertit l'opérateur de toute panne du mécanisme de contrôle apte à causer le débordement du réservoir de décantation. Le réservoir de vidange horizontal de 10 pieds sur 30 a une contenance suffisante pour contenir le courant jusqu'à ce qu'on ait pu rétablir le contrôle normal. Dans le cas où il serait impossible d'arrêter le courant qui cause le débordement, les soupapes de trop-plein du réservoir de décharge s'ouvriront et laisseront le courant s'ecouler dans une fosse évasée ouverte où on pourra le brûler. Une autre mesure de précaution comprend un régulateur sur le côté à courant remontant du réservoir de décantation qui sert à fermer et interrompre le courant d'arrivée. Pour vider le réservoir de vidange on a prévu un dispositif de soufflerie qui en souffle le contenu dans le réseau en même temps que le gaz résiduaire.

Dans des conditions normales le produit passe à travers le réservoir de décantation, puis dans le collecteur de compteur où il est mesuré par des compteurs de liquide du type à déplacement positif, qui sont contrôlés par thermostat pour donner de lectures en gallons nets à 60 degrés F. Après avoir quitté les compteurs le produit passe dans un des deux réservoirs à pression sphériques de 2.500 barils qui fonctionnent au-dessus de la pression de vapeur du liquide aux températures régnantes, mais à 10 ou 15 lbs. de moins que la pression du réservoir de décantation. Le courant qui part du réservoir de décantation pour passer à travers les compteurs et aboutir aux réservoirs sphériques est réglé par un régulateur à contre-pression situé entre les compteurs et les sphères. Ce régulateur est commandé par le régulateur de niveau de liquide sur le tambour de décantation. Les sphères sont munies de colonnes manomètres, de thermomètres indicateurs à cadran et de raccords d'échantillonnage. Parmi les dispositifs de sûreté, on a prévu des soupapes de trop-plein, des têtes d'eclatement et une conduite de décharge séparée avec vanne à distance. Les sphères sont aussi munies de conduites d'entrée et de sortie de gaz avec des régulateurs pour maintenir la pression désirée.

L'équipment disposé le long de ce réseau est vérifié fréquemment pour s'assurer de la précision des compteurs et de l'état des machines, car la manutention de ce liquide très volatile est dangereuse, mais on peut la faire en toute sécurité en prenant les précautions nécessaires contre les fuites et autres sources possibles de danger.

PURGE DES CONDUITES A GAZ

Une méthode de nettoyage toute spéciale pour les conduites à gaz a été mise au point pour avoir

(Continué sur Page 294)

ayuda de bomba, pequeñas cantidades de agua, kerosina y solución cáustica. La última carga de solución fué seguida por agua, herramienta raspadora y gasolina de esencia de gas natural de 18 lbs. Esta limpieza resultó satisfactoria y sólo se obtuvo una cantidad mínima de gasolina desteñida. El mismo equipo empleado para el bombaje de la solución de limpieza se utilizó también para el bombaje de la gasolina, y la limpieza dió a la línea y equipo de bombaje un ensayo completo antes de la transmisión normal de gasolina.

La estación receptora en el campo en East Texas recibe la gasolina de esencia de gas natural, mezclada con grandes cantidades de butano y ciertas cantidades menores de propano, después de pasada por un medidor. El producto entra primeramente en "tambor de estabilización," que es un tanque horizontal de 8 por 30 pies, que sirve para extraer el agua y otras substancias extrañas, antes de la medición del líquido. Como las mezclas que se manejan en este sistema son en extremo volátiles, todo el equipo está calculado para funcionar con presiones de trabajo de 150 libras. Para mantener una presión constante en todo el equipo, se instaló una tubería de gas, para inyectar gas residual proveniente de una refinería de gasolina cercana. El gas entrante o saliente de cualquier elemento del equipo se mantiene a la presión deseada con la ayuda de reguladores, y la presión, en todo el sistema, es siempre superior a la presión del vapor. El tanque de estabilización está proyectado para funcionar casi a carga completa y el nivel está gobernado por un regulador de nivel líquido. Como el tanque recibe gasolina a razón de varios centenares de barriles por hora, se ha instalado un tanque de escape o derrame para manejar lo excedente, en caso de que algún elemento del equipo deje de funcionar. Una señal de alarma notifica al operario la falla de cualquier mecanismo de gobierno susceptible de causar derrame en el tanque de estabilización. El tanque de escape, de tipo horizontal, de 10 por 30 piés, tiene suficiente capacidad para manejar la corriente hasta que se rectifique la regulación. Al ser imposible cortar la corriente causante del derrame, las válvulas de escape del tanque de escape se abren, permitiendo la salida del chorro a un foso abierto, donde puede quemarse. Por vía de adicional precaución, se emplea un regulador en el lado de la corriente ascendente del tanque de estabilización, que sirve para cerrar y cortar la corriente entrante. Para despejar o vaciar el tanque de escape, se le aplica un chorro de gas residual, el cual barre con todo el contenido del sistema.

Bajo condiciones normales, el producto entra al tanque de estabilización y pasa al medidor. Aquí es medido por aparatos de medición de desplazamiento positivo, los cuales están termostáticamente ajustados para acusar en unidades de galón, a 60 grados F. Después de salir de los medidores, el líquido entra en uno de los dos tanques esféricos de presión, de 2.500 barriles, mantenidos a mayor presión que la del vapor del líquido a las temperaturas existentes, pero de 10 a 15 libras menos que la presión en el tanque de estabilización. La corriente del líquido por el tanque de estabilización, medidores y tanques esféricos, está gobernada por un regulador de contrapresión instalada entre los medidores y los tanques esféricos. Este regulador es accionado por el regulador de nivel líquido del tanque de estabilización. Los tanques esféricos están provistos de columnas indicadoras, termómetros de indicación en cuadrante y conexiones para sacar muestras. Entre las medidas de seguridad se comprenden un suficiente número de válvulas de escape o desahogo, cabezas de estallido y una tubería de descarga con salida a distancia. Los tanques esféricos están provistos también de tuberías de entrada y de salida, con reguladores para mantener la presión del caso.

El equipo de todo este sistema está sujeto a contínua inspección, para verificar la exactitud de los indicadores y el estado de la maquinaria, en general, pues el manejo de este líquido tan volátil, es peligroso. Sin embargo, no hay ningún peligro cuando se toman todas las precauciones necesarias para evitar escapes y otras causas provocativas de accidentes.

PURGA DE LAS TUBERIAS DE GAS

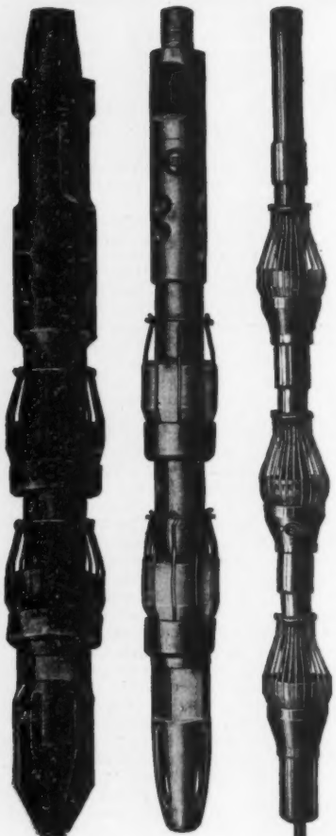
Se ha perfeccionado un método de limpieza muy interesante para las tuberías conductoras de gas, que evita las dificultades que se presentan en conexión con el raspador ordinario, llamado "go-Devil." En lugar de éste, se emplean virutas de acero. A intervalos reguladores de 5 millas se

(Continué en Página 294)

THE GUIBERSON CORPORATION

Dallas, Texas, U. S. A.

Maracaibo — Export Office: 30 Rockefeller Plaza, New York, N. Y. — Trinidad



GUIBERSON SWABS

Patented

The GUIBERSON Swab is the only swab constructed on the correct principle, flexible cups yielding to by-pass fluid and obstructions running in, but being pressed tight against pipe by fluid pressure, coming out. Advantages: 1. Raises full loads; 2. Cups yield to pass projections and paraffin—will not stick; 3. Runs in faster; 4. Special composition cups protected by steel wires, wear longer; 5. Less wear on tubing and casing. Type K Casing and Tubing Swabs and Type A Swab are shown.

ECOUVILLONS GUIBERSON

Brevetés

L'écouvillon GUIBERSON est le seul écouvillon construit selon le principe correct, avec cuvettes flexibles cédant au liquide de dérivation et aux obstructions qui entrent, mais pressées ferme contre le tuyau par la pression du liquide qui sort. Avantages: 1. Soulève les charges totales; 2. Les cuvettes cèdent pour passer les saillies et la paraffine—non susceptibles de coincer; 3. S'introduit plus rapidement; 4. Les cuvettes, en composition spéciale et protégées par des fils d'acier, durent plus longtemps; 5. Moins d'usure sur le tubage et le revêtement. On voit ici les écouvillons de revêtement et tubage de type K.

ESCOBILLONES GUIBERSON

Patentados

El escobillón Guiberson es el único escobillón construido según principio correcto, con las tazas o cubetas flexibles cediendo al líquido en derivación y a las obstrucciones entrantes, pero firmemente cerradas contra el tubo, por la presión del líquido saliente. Ventajas: Aumenta las cargas totales; 2. Las tazas ceden para dejar pasar partículas y la parafina; no se pueden atascar o trabar; 3. Se introduce más rápidamente; 4. Las tazas de composición especial y protegidas por alambres de acero, duran mucho más; 5. Menos desgaste sobre la tubería y el revestimiento. Mostramos aquí los escobillones de tipo K para revestimiento y tubería.

WIRE LINE OIL SAVER

Patented

The GUIBERSON Wire Line Oil Saver is the outstanding device of its kind. Its patented method of adjusting both rubbers simultaneously and uniformly by turning one crank insures equalized pressure and uniform wear on rubbers. 500 pounds test. Easiest to operate. Perfected in every detail.

ECONOMISEUR DE PETROLE SUR CABLE

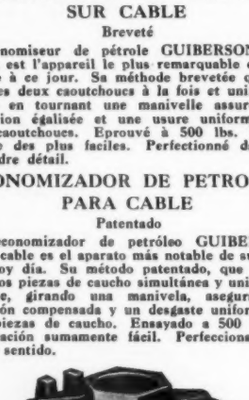
Breveté

L'économiseur de pétrole GUIBERSON sur câble est l'appareil le plus remarquable de son genre à ce jour. Sa méthode brevetée qui règle les deux caoutchoucs à la fois et uniformément en tournant une manivelle assure une pression égalisée et une usure uniforme sur les caoutchoucs. Eprouvé à 500 lbs. Manoeuvre des plus faciles. Perfectionné dans le moindre détail.

ECONOMIZADOR DE PETROLEO PARA CABLE

Patentado

El economizador de petróleo GUIBERSON para cable es el aparato más notable de su clase de hoy día. Su método patentado, que regula las dos piezas de caucho simultánea y uniformemente, girando una manivela, asegura una presión compensada y un desgaste uniforme en las piezas de caucho. Ensayado a 500 libras. Operación sumamente fácil. Perfeccionado en todo sentido.



SUCKER ROD STRIPPER

Patent Pending

The GUIBERSON perfected Sucker Rod Stripper provides a positive seal against escape of oil and gas, when running in or pulling rods. Strips paraffin as well as oil from rods and couplings. Specially developed rubbers are long-lived. Two sizes of rubbers handle all sizes of rods.

DEPOUILLER DE TIGES ASPIRATRICES

Brevet en instance

Le dépouilleur de tiges aspiratrices perfectionné GUIBERSON assure un joint positif contre l'échappement de pétrole et de gaz quand on descend ou qu'on retire les tiges. Dépouille les tiges et raccords de la paraffine ainsi que du pétrole. Caoutchoucs de mise au point spéciale faisant long usage. Deux tailles de caoutchouc suffisent pour toutes les tailles de tiges.

DESGARRADOR DE VARILLAS DE ASPIRACION

Patente pendiente

El desgarrador de varillas de aspiración perfeccionado GUIBERSON asegura un cierre seguro contra el escape de petróleo y de gas, cuando se descienden o se levantan las varillas. Desgarra o quita toda la parafina y el petróleo de las varillas y de los acoplamientos. Las piezas de caucho de tipo perfeccionado son muy durables. Dos tamaños de piezas de caucho se adaptan a todos los tamaños de varilla de aspiración.

Type E — Type C — Type B

TUBING CATCHERS

GUIBERSON introduced the automatic tubing catcher and offers the world's most complete and highly perfected line. Type E is for wells of any depth—Type B for wells under 4,000 feet—Type C for wells with faulty or thin casing. A few advantages: 1. Slips of larger and ample size operate accurately on dovetail tracks; 2. Load-Carrying parts are heat-treated alloy steel; 3. Special non-fatiguing spring; 4. Largest by-pass area. In pumping wells we recommend use of GUIBERSON Tubing Catcher Anchor, shown at right, with catcher, for increased pumping efficiency.

ATTRAPE-TUBES

GUIBERSON présente l'attrape-tubage automatique, et en offre la gamme la plus complète et la plus perfectionée au monde. Le type E est pour puits de toute profondeur—le type B pour puits de moins de 4000 pieds—Type C pour puits avec revêtement mince ou défectueux. A signaler entre autres avantages: 1. Fourreaux de forte et ample taille qui fonctionnent avec précision sur glissières en queue d'aronde; 2. Les pièces qui portent la charge sont en acier spécial traité thermiquement; 3. Ressort spécial ne fatiguant pas; 4. Surface de dérivation maximum. Dans le pompage des puits, nous recommandons l'emploi de l'ancre attrape-tubes GUIBERSON, représentée à droite, avec attrape-tubes, pour augmenter le rendement de pompage.

ATRAPADOR DE TUBERIA

La GUIBERSON fué la introductora del atrapador automático de tubería y ofrece ahora el surtidó más completo del mundo, de estos productos. El tipo E es para pozo de cualquier profundidad—el tipo B, para pozos de menos de 4.000 piés—el tipo C, para pozos con revestimiento delgado o defectuoso. Entre otras ventajas citamos aquí las siguientes: 1. Sujetadores de tamaño convenientemente grande funcionan con sguridad en vías a estilo de cola de milano; 2. Las piezas que llevan la carga son de acero especial tratado térmicamente; 3. Resorte especial de gran duración; 4. Superficie de derivación máxima. Para los pozos de corriente natural, recomendamos el empleo de la ancla atrapadora de tubería GUIBERSON, mostrada a la derecha, con el atrapador de tubería, para aumentar el rendimiento del bombeo.

Heavy Type

TUBING SPIDERS

Patented

The GUIBERSON Tubing Spider offers two outstanding advantages over others, in its new patented Guide Head, and its arrangement for controlling slips with one lever. The adjustable Guide Head guides tubing to exact center of bore, causing slips to seat accurately. Operator then controls slips by means of the lever. Weight can be set so slips ride tubing when coming out, and automatically grip it if it falls—or so slips retract when tubing is lifted. Heavy type handles 2" to 4" tubing in any depth well. Medium type handles 2" to 3" tubing and will support 5000 feet of 3" upset tubing.

CROISILLONS DE TUBAGE

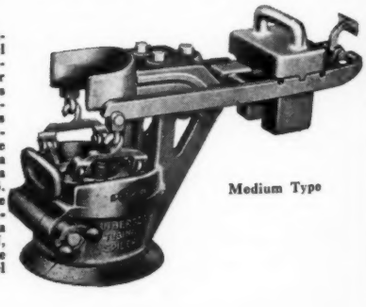
Brevetés

Le croisillon de tubage GUIBERSON offre deux avantages saillants sur les autres, à savoir sa nouvelle tête guide brevetée, et son dispositif de contrôle des fourreaux au moyen d'un seul levier. La tête de guidage réglable guide le tubage au centre exact de l'alésage, ce qui permet aux fourreaux de se poser avec précision. L'opérateur contrôle alors les fourreaux au moyen du levier. On peut régler le poids de manière à ce que les fourreaux s'appuient contre le tubage en sortant, et le saisissent automatiquement s'il vient à tomber—ou pour que les fourreaux se rétractent quand on soulève le tubage. Le type fort est prévu pour tubage de 2 à 4 pouces dans puits de toute profondeur. Le type moyen pour tubage de 2 à 3 pouces et pourra soutenir 5000 pieds de tubage renforcé de 3 pouces.

CRUCETAS PARA TUBERIA

Patentadas

La cruceta GUIBERSON para tubería ofrece dos ventajas sobresalientes sobre todas las demás, que son su nueva cabeza de guía patentada y su dispositivo de control de sujetadores accionado mediante una sola palanca. La cabeza de guía ajustable guía la tubería por el centro exacto del agujero, lo que permite que los sujetadores se coloquen con precisión. El operario controla entonces los sujetadores mediante una palanca. El peso puede entonces ajustarse de modo que los sujetadores queden sueltos sobre la tubería mientras ésta va saliendo, pero agarrándola y reteniéndola automáticamente en caso de que tienda a bajar o cuerse, o sencillamente retrayéndose cuando se va sacando o levantando la tubería. El tipo pesado sirve para tubería de 2" a 4", en pozo de cualquiera profundidad. El tipo mediano sirve para tubería de 2" a 3" y puede soportar 5.000 piés de tubería reforzada de 3 pulgadas.



Medium Type

See GUIBERSON Complete Catalog, in Composite Catalog.

THE GUIBERSON CORPORATION

Dallas, Texas, U. S. A.

Maracaibo — Export Office: 30 Rockefeller Plaza, New York, N. Y. — Trinidad

Type A-1

FLOOR BLOCKS

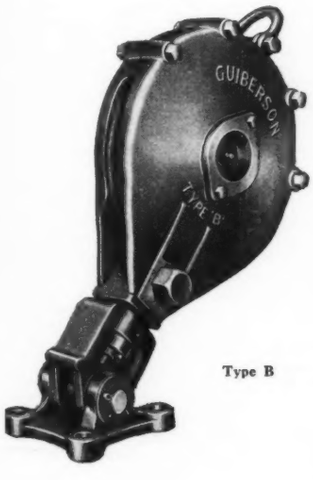
Advantages of GUIBERSON Floor Blocks are: 1. They stand up off floor (lateral movement is only 45 degrees each way); 2. Frames can be set over line without threading it through block; 3. Sheaves rotate on roller bearings; 4. In Type B, frame forms complete safety guard. Both blocks are of simple design and sturdy construction. Type A-1 has 16¼" O.D. cast steel sheave, with ⅞" A.P.I. machined groove. Type B has 22" O.D. cast steel sheave, with 1" A.P.I. machined groove. Capacities are ample for wells up to 7,000 feet.

BLOCS DE PLANCHER

Les avantages des blocs de plancher GUIBERSON sont: 1. Ils tiennent décalés du plancher (le mouvement latéral n'est que de 45 degrés dans chaque sens); 2. Les bâtis peuvent être mis au-dessus du câble sans devoir fileter à travers le bloc; 3. Les poulies tournent sur roulements à rouleaux; 4. Dans le type B, le bâti forme un protecteur complet. Ces deux blocs sont de tracé simple et de construction robuste. Type A-1 a une poulie en acier coulé de 16¼ pouces de D.E., avec gorge usinée de ⅞ de pouce A.P.I. Type B a une poulie en acier coulé de 22 pouces de D.E. avec gorge usinée de 1 pouce A.P.I. Amples capacités pour puits jusqu'à 7.000 pieds.

POLEAS O BLOQUES DE PISO

Las ventajas de los bloques de piso GUIBERSON son: 1. Se levantan sobre el piso (con un movimiento lateral de sólo 45 grados en cada sentido); 2. Los bastidores pueden ponerse encima del cable, sin necesidad de pasar éste por el bloque; 3. Las poleas giran en rodillos de rodillos; 4. En el tipo B, el bastidor forma un protector completo. Estos dos aparejos son de trazado sencillo y de construcción muy firme. El tipo A-1 tiene una polea de acero colado de 16¼" de diámetro exterior, con garganta labrada a máquina de ⅞", según patrón del A.P.I. Amplias capacidades para pozos hasta de 7.000 piés.



Type B

Type C-1 Type G-1 Type GT

CONTROL HEAD PACKERS

Patented

GUIBERSON patented Control Head Packers possess several exclusive advantages: 1. Valve at top permits running in against heavy flows, oil and gas passing upward through packer; 2. Passage can be opened through packer at will, after setting, by simply raising tubing; 3. Packer can be reset higher or lower at will; 4. No swabbing effect, coming out, as valve opens; 5. Neoprene packing used with G Packers and optional with C-1 is oil resisting and will not stick. Types shown are C-1, with single rubber of graphited rubber or Neoprene; G-1 with two rubbers of Neoprene; and GT Type, similar to G-1 but with 30" valve opening. The 2-rubber packers offer a new advantage as when packer is set the backs of metal parts which hold rubbers are in contact with each other and carry the tubing. In Type GT the 30" valve opening eliminates nozzling effect, also allows valve to be opened after packer is set without changing position of packer.

GARNITURES DE TETES DE CONTROLE

Brevetées

Les garnitures de têtes de contrôle, brevetées, GUIBERSON, ont plusieurs avantages exclusifs: 1. La soupape au sommet permet d'introduire même en opposition à un fort écoulement, le pétrole et le gaz passant vers le haut à travers la garniture; 2. On peut à volonté faive un passage à travers la garniture, après la pose, en soulevant simplement le tubage; 3. On peut reposer la garniture plus haut ou plus bas à volonté; 4. Pas d'effet d'écouvillonnage à la sortie car la soupape s'ouvre; 5. La garniture Neoprene employée avec les garnitures G et facultative avec C-1 résiste à l'action du pétrole et ne coincera pas. Les types montrés sont de C-1 avec simple caoutchouc en caoutchouc graphité ou en Neoprene; G-1 avec deux caoutchoucs de Neoprene; et le type GT, analogue au G-1 mais avec ouverture de vanne de 30 pouces. Les garnitures à 2 caoutchoucs offrent un nouvel avantage car lorsqu'on pose la garniture les dos des pièces métalliques qui tiennent les caoutchoucs viennent en contact entre elles et portent le tubage. Dans le type GT l'ouverture de vanne de 30 pouces supprime l'effet d'ajutage, et permet aussi d'ouvrir la vanne après que la garniture est placée et sans changer la position de celle-ci.

OBTURADORES DE CABEZA DE CONTROL

Patentados

Los obturadores de cabeza de control GUIBERSON, patentadas, tienen varias ventajas exclusivas: 1. La válvula superior permite introducir, aun en oposición a una fuerte corriente, el petróleo y el gas que pasan hacia arriba a través del obturador; 2. A voluntad se puede abrir un paso a través del obturador, después de colocado, sencillamente levantando la tubería; 3. Se puede colocar el obturador más arriba o más abajo, como y cuando se quiera; 4. No hay efecto de escobillón, al salir, pues la válvula se abre; 5. La empaquetadura Neoprene empleada con los obturadores G, y ofrecida como equipo a elección, con los modelos C-1, resiste la acción del petróleo y no puede atascarse o trabarse. Los tipos mostrados son el C-1 con una sola pieza de caucho corriente, o de caucho grafitado o de Neoprene; el G-1 con dos piezas de caucho de Neoprene y el tipo GT, similar al G-1, pero con abertura de válvula de 30". Los obturadores con dos piezas de caucho ofrecen una nueva ventaja, pues mientras se coloca el obturador, las dos piezas metálicas que llevan las piezas de caucho entran en contacto para sostener la tubería. En el tipo GT, la abertura de válvula de 30 pulgadas suprime el efecto de boquilla y permite también abrir la válvula, después de colocado el obturador, sin cambiar la posición de este último.

SPECIAL PACKERS

Patented

GL

The Type GL Control Head Liner Packer and the Type GA Control Head Anchor Packer are designed to answer the need for inexpensive packers of control-head type for use respectively in packing off casing in wells equipped with liners, and in packing off casing or open hole with anchor in bottom of well.

All parts of both packers are interchangeable with parts of the Type GL, with the exception of mandrel. Two separate short rubber sleeves are used for packing medium and are made of oil-resisting, non-sticking Neoprene. Upset tubing is used throughout.

GARNITURES SPECIALES

Brevetées

La garniture de chemise à tête de contrôle de type GL et la garniture d'ancre à tête de contrôle de type GA sont conçues pour répondre à la demande en garnitures bon marché du type à tête de contrôle pour emploi tant pour garnir le revêtement dans les puits munis de chemises que pour garnir le revêtement ou trou ouvert avec ancre au fond du puits.

Toutes les pièces de ces deux types de garnitures sont interchangeables avec les pièces du type GL, à l'exception du mandrin. Deux courts manchons séparés en caoutchouc sont employés comme moyen de garniture et sont en Neoprene non coinçant et résistant à l'action du pétrole. Il est employé uniquement du tubage renforcé.

GA

OBTURADORES ESPECIALES

Patentados

El obturador de forro de cabeza de control de tipo GL y el obturador de ancla de cabeza de control de tipo GA han sido especialmente construídos para responder a la demanda de obturadores económicos de tipo de cabeza de control, para emplearse respectivamente en la obturación del revestimiento en los pozos con forros y en la obturación del revestimiento o agujero abierto, con ancla al fondo del pozo.

Todas las piezas de ambos obturadores son intercambiables con las piezas del tipo GL, con la excepción del mandril. Dos manguitos de caucho, cortos y separados, se emplean como elemento de obturación, y se hacen de Neoprene de gran resistencia al petróleo, y a prueba de atascamiento o pegadura. Se emplea únicamente una tubería reforzada.

TYPE F PACKERS

Patented

Type F Packer is a single-rubber packer, designed to meet the need of operators for an inexpensive packer where uses and advantages of GUIBERSON Control-Head Packers are not required. Supplied with or without relief valve, at top. When packer has relief valve (right), and is set, the tubing load maintains a seal between valve and valve seat. When packer is removed, tubing is lifted, thus opening valve seat, allowing fluid and sand to drain back to bottom of well through tubing. Single packing medium is Neoprene Rubber, which is oil-resisting and long-lived and will not stick to casing.

GARNITURES DE TYPE F

Brevetées

La garniture de type F est une garniture à un seul caoutchouc, conçue pour répondre à la demande des opérateurs pour une garniture bon marché dans les cas où les avantages et mérites des garnitures à tête de contrôle GUIBERSON ne sont pas nécessaires. Fournie avec ou sans soupape de décharge au sommet. Quand la garniture a une soupape de décharge (à droite), et est placée, la charge de tubage maintient un joint hermétique entre la soupape et son siège. Quand on enlève la garniture, on soulève le tubage, ouvrant ainsi le siège de soupape, et permettant au fluide et au sable de retourner au fond du puits par le tubage. La seule matière de garniture employée est le caoutchouc Neoprene, à la fois résistant au pétrole, très durable et non susceptible de coincer au revêtement.

OBTURADORES ESPECIALES DE TIPO F

Patentados

El tapón de tipo F es un tapón de una sola pieza de caucho, ideado para responder a la demanda de un obturador de precio económico, en el caso en que las ventajas y los méritos de los obturadores de cabeza de control GUIBERSON no sean necesarias. Se suministra con válvula de descarga arriba, o sin ella. Cuando el obturador tiene una válvula de descarga (a la derecha) una vez colocado, la carga de la tubería mantiene un cierre hermético entre la válvula y su asiento. Cuando se quita el obturador, la tubería se levanta, abriendo así el asiento de la válvula y permitiendo que el líquido y la arena regresen al fondo del pozo por la tubería. El único material empleado en estos obturadores como elemento de obturación, es el caucho Neoprene, a prueba de petróleo, de gran duración y a prueba de atascamiento o pegadura en el revestimiento.

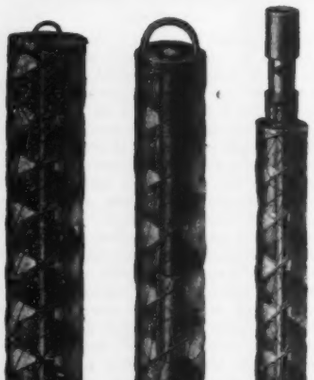
Voir le catalogue complet GUIBERSON, dans le catalogue combinaison.

Sírvase ver el catálogo completo de GUIBERSON, en el catálog de combinación.

THE GUIBERSON CORPORATION

Dallas, Texas, U. S. A.

Maracaibo — Export Office: 30 Rockefeller Plaza, New York, N. Y. — Trinidad



Standard Collapsible Wash-Down

SPIRAL PLUGS

Patented

The GUIBERSON Spiral Bottom Water Plug has been uniquely successful because its spirals, when collapsed, expand laterally and take a screw-like bite into the walls of the well instead of a mere friction grip. Oakum is used as packing between the boiler-plate spirals. Slips in Anchor Socket screwed in bottom plate permit core to pass downward through socket when plug is collapsed to set, but prevents it moving upward. Three types are offered, as shown; Standard, for setting a few feet off bottom of well; Collapsible Core, for setting directly against bottom of well; and Wash-Down Type through which water may be circulated to wash out hole before setting plug.

TAMPONS A SPIRALES

Brevetés

Le tampon à spirales GUIBERSON pour eau de fond a eu un rare succès par suite du fait que ses spirales, une fois rabattues, s'écartent latéralement et mordent selon une vis dans les murs du puits au lieu d'une simple emprise de frottement. On emploie de l'oakum comme garniture entre les spirales plaques de chaudière. Les fourreaux de la douille d'ancre, vissés dans la plaque de fond, permettent au corps de passer vers le bas à travers la douille quand le tampon est rabattu pour la pose, mais l'empêchent de se déplacer vers le haut. Il en est offert 3 types, comme représentés: Standard, pour la pose à quelques pieds du fond du puits; corps rabattable, pour pose directement contre le fond du puits; et type à lavage à travers lequel on peut circuler de l'eau pour laver le puits avant de poser le tampon.

TAPONES ESPIRALES

Patentados

El tapón espiral GUIBERSON para agua de fondo, ha tenido mucho éxito, debido al hecho de que sus espiras, al soltarse, se extienden lateralmente y muerden, como un tornillo, en la pared del pozo, en lugar de tener con ella una sencilla sujeción por rozamiento. Se emplea estopa como empaquetadura entre las espiras de placa de caldera. Los sujetadores en el soporte del ancla, atornillados en la placa del fondo, permiten al cuerpo pasar hacia abajo, a través del soporte, cuando el tapón está preparado para la colocación, pero impiden que se mueva hacia arriba. Se ofrecen tres tipos, como los ilustrados: el Standard, para colocación a unos pocos pies del fondo del pozo; el de cuerpo plegadizo, para colocación directa contra el fondo del pozo, y el tipo de lavado, a través del cual puede circular el agua, para limpiar el agujero antes de la colocación del tapón.

SPIRAL PACKERS

Patented

GUIBERSON Spiral Tubing and Casing Packers, like Spiral Plugs, are the only formation packers that do not rely on friction. Steel spirals expand and bite when collapsed, and the oakum packing medium packs off any deformity.

GARNITURES A SPIRALES

Brevetées

Les garnitures à spirales GUIBERSON pour tubage et revêtement, de même que les tampons à spirales, son les seules garnitures de formation qui ne se basent pas sur le frottement. Les spirales d'acier s'écartent et mordent lors du rabattement, et la matière de garniture oakum obture toute irrégularité de forme.

OBTURADORES ESPIRALES

Patentados

Los obturadores espirales GUIBERSON para tubería y revestimiento, lo mismo que los tapones espirales, son los únicos obturadores de formación que no dependen del rozamiento para su sujeción. Las espiras de acero se extienden y muerden, cuando se sueltan, y con la ayuda de estopa se cierran todas las deformaciones.

TUBING STRIPPER

Patented

The GUIBERSON Tubing Oil Stripper is a compact self-pressure-adjusting Tubing Stripper which strips all the oil and paraffin from the outside of the tubing as it is pulled and prevents gas leakage around tubing. It is compact, simple in construction, easy to assemble on tubing.

DEPOUILLEUR DE TUBAGE

Breveté

Le dépouilleur de tubage GUIBERSON pour enlever le pétrole est un dépouilleur de tubage compact à auto-réglage de pression qui dépouille l'extérieur du tubage de tout le pétrole et la paraffine quand on tire ce tubage, empêchant toute fuite de gaz autour de ce dernier. Il est simple, compact et facile à monter sur le tubage.

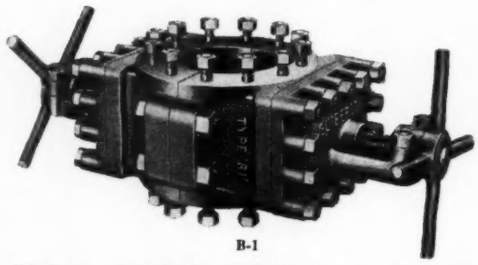
DESGARRADOR DE TUBERIA

Patentado

El desgarrador de tubería GUIBERSON es un modelo compacto de ajuste automático, que raspa todo el petróleo y parafina de la parte exterior de la tubería, mientras se le mueve, y evita el escape de gas alrededor de la tubería. Este desgarrador es de sencilla construcción y puede colocarse con facilidad en la tubería.

DRILL PIPE AND TUBING OIL SAVERS

Patented

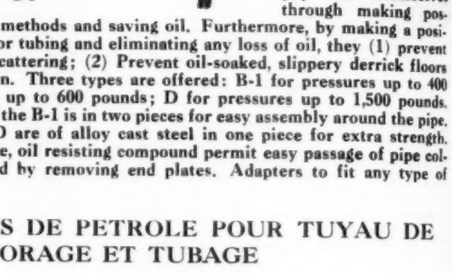


B-1

GUIBERSON stands alone in having perfected a complete line of Oil-Saver equipment for high-pressure wells. There is no other equipment on the market comparable to these GUIBERSON High-Pressure Drill-Pipe and Tubing Oil Savers. These savers quickly pay for themselves through making possible improved production methods and saving oil. Furthermore, by making a positive seal around drill-pipe or tubing and eliminating any loss of oil, they (1) prevent fires by keeping oil from scattering; (2) Prevent oil-soaked, slippery derrick floors which cause injuries to men. Three types are offered: B-1 for pressures up to 400 pounds; C-2 for pressures up to 600 pounds; D for pressures up to 1,500 pounds. Heavy cast steel housing of the B-1 is in two pieces for easy assembly around the pipe. Housings of the C-2 and D are of alloy cast steel in one piece for extra strength. Special rubbers of a durable, oil resisting compound permit easy passage of pipe collars and are easily changed by removing end plates. Adapters to fit any type of hook-up are available.

ECONOMISEURS DE PETROLE POUR TUYAU DE FORAGE ET TUBAGE

Brevetés

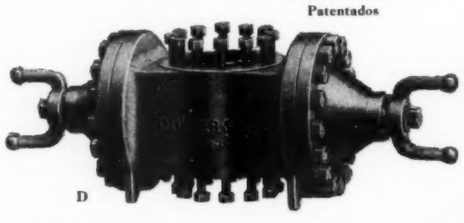


C-2

GUIBERSON est seul à avoir perfectionné une série complète de matériel économiseur de pétrole pour puits fortes pressions. Il n'y a pas d'autre matériel sur le marché qui puisse soutenir la comparaison avec ces économiseurs de pétrole GUIBERSON pour tuyau de forage et tubage sous hautes pressions. Ces économiseurs amortissent leur prix d'achat à breve échéance en permettant de meilleures méthodes de production et des économies de pétrole. En outre, en réalisant un joint positif autour du tuyau de forage ou tubage et en supprimant toute perte de pétrole, ils (1) préviennent les incendies en empêchant le pétrole de s'éparpiller; (2) ne connaissent plus les planchers de derrick imprégnés de pétrole et glissants pouvant causer des accidents au personnel. Il en est offert 3 types: B-1 pour pressions jusqu'à 400 lbs.; C-2 pour pressions jusqu'à 600 lbs.; D pour pressions jusqu'à 1.500 lbs. Lourd boîtier en acier coulé pour le B-1, en 2 pièces, d'ou montage facile autour du tuyau. Les boîtiers des C-2 et D sont en acier spécial coulé d'une seule pièce pour plus de force. Des caoutchoucs spéciaux en composé durable, résistant au pétrole, permettent un passage facile des colliers de tuyau et sont faciles à changer en enlevant les flasques. Adapteurs prévus pour tout type de montage adopté.

ECONOMIZADORES DE PETROLEO PARA TUBO DE PERFORACION Y TUBERIA

Patentados



D

GUIBERSON goza de la exclusiva distinción de haber perfeccionado un completo surtido de economizadores de petróleo para pozos sujetos a grandes presiones. Actualmente no hay en todo el mercado otro equipo que pueda compararse, en efectividad, con los economizadores de petróleo GUIBERSON para tubo de perforación y tubería bajo altas presiones. Estos economizadores pronto devuelven su propio precio, gracias al mejoramiento de los métodos de producción y ahorros en petróleo que establecen en la explotación. Por otra parte, al formar un cierre positivo alrededor del tubo de perforación o tuberia, y al evitar toda pérdida de petróleo, producen los siguientes resultados: (1) evitan los incendios, pues el petróleo no puede desparramarse; (2) evitan que el piso de la torre se ponga aceitoso y resbaloso, con peligro para los operarios. Se ofrecen en tres tipos: B-1 para presiones hasta de 400 libras; C-2 para presiones hasta de 600 libras; D para presiones hasta de 1.500 libras. La gruesa tapa de acero fundido del modelo B-1 consta de dos piezas, para facilitar su instalación alrededor del tubo. Las tapas o cubiertas de los modelos C-2 y D son de aleación de acero fundida en una sola pieza, para adicional firmeza. Las piezas de caucho son de una especial composición muy durable y resistente al petróleo; permiten el fácil paso de los collares de tubería y pueden cambiarse con facilidad separando las placas laterales. Se ofrecen adaptadores para ajustarlos a cualquier tipo de conexión empleado.

See GUIBERSON Complete Catalog, in Composite Catalog.

THE GUIBERSON CORPORATION

Dallas, Texas, U. S. A.

Maracaibo — Export Office: 30 Rockefeller Plaza, New York, N. Y. — Trinidad

PRESSURE DRILLING EQUIPMENT

Patented and Patents Pending

With the use of GUIBERSON "drilling-in-under-controlled-pressure" completion equipment the operator is now able to drill low pressure sands and highly permeable lime formations, employing the use of oil, a mixture of oil and gas, or gas alone, as a circulating column. The low-pressure set-up shown consists of a GUIBERSON Type A Friction Kelly Drive, which fits any standard make of rotary, and has a special non-slipping, non-scarring gripping arrangement to fit flush joint or standard drill pipe,—and a GUIBERSON Type D High Pressure Tubing Oil Saver. The high-pressure set-up shown at right consists of a GUIBERSON Type B Collapsible Friction Kelly Drive, a GUIBERSON Type C Drilling Head constructed to withstand 3,000 pounds test pressure, a Quick-Detachable Coupling, and a GUIBERSON Type D High Pressure Tubing Oil Saver. The GUIBERSON Type C Drilling Head is designed to fit around a 3½" O.D. round Kelly or drill pipe, but can be furnished for smaller diameters if desired. The packing medium rotates with the Kelly, thus eliminating wear on packing.

MATERIEL DE FORAGE SOUS PRESSION

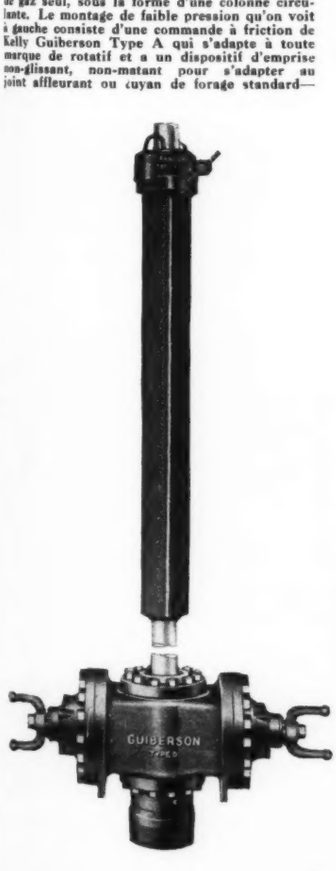
Brevets obtenus et en instance

Par l'emploi du matériel d'épuisement GUIBERSON "de forage sous pression contrôlée," l'exploitant est maintenant à même de forer des sables à faible pression et des gîtes calcaires très perméables, faisant usage de pétrole, d'un mélange de pétrole et de gaz, ou de gaz seul, sous la forme d'une colonne circulante. Le montage de faible pression qu'on voit à gauche consiste d'une commande à friction de Kelly Guiberson Type A qui s'adapte à toute marque de rotatif et a un dispositif d'emprise non-glissant, non-matant pour s'adapter au joint affleurant ou cuyan de forage standard—et un économiseur de pétrole pour tubage haute pression GUIBERSON Type D. Le montage de haute pression qu'on voit à droite consiste d'une commande à friction de Kelly rabattable GUIBERSON Type B, d'une type de tête de forage GUIBERSON Type C prévue pour résister à une pression d'épreuve de 3.000 lbs., un raccord rapidement détachable, et un économiseur de pétrole pour tubage haute pression GUIBERSON Type D. La tête de forage GUIBERSON Type C est prévue pour s'adapter autour d'un Kelly rond ou tuyau de forage de D.E. de 3½ pouces, mais peut être fourni pour plus petits diamètres sur demande. La matière de garniture tourne avec le Kelly, d'où non-usure de la garniture.

EQUIPO DE PERFORACION BAJO PRESION

Patentes obtenidas y pendientes

Mediante el empleo del equipo GUIBERSON de "perforación bajo presión gobernada," el explotador puede ahora, perforar en arena de baja presión y en formaciones calcáreas de gran permeabilidad, utilizando el petróleo, una mezcla de petróleo y de gas, o gas solo, como columna de circulación. El modelo de baja presión, que mostramos a la izquierda, consta de una propulsión de fricción Kelly GUIBERSON de tipo A, que se adapta a toda marca de rotativa, y tiene un dispositivo de sujeción o agarro, que no puede resbalar ni raspar, para ajustarse a unión plana o tubo de perforación corriente—y un economizador de petróleo para tubería de alta presión GUIBERSON, tipo D. El modelo de alta presión, que mostramos a la derecha, consta de una propulsión de fricción de Kelly plegadiza GUIBERSON de tipo B, un tipo de cabeza de perforación GUIBERSON de tipo C calculada para resistir una presión de ensayo de 3.000 libras, una conexión de rápido desprendimiento y un economizador de petróleo para tubería de alta presión GUIBERSON de tipo D. La cabeza de perforación GUIBERSON de tipo C puede adaptarse alrededor de un kelly cilíndrico o tubo de perforación de 3½" de diámetro exterior, pero puede suministrarse también, a solicitud, para diámetros más pequeños. El elemento de empaquetadura gira con el kelly, evitándose así el desgaste de la empaquetadura.



FLOW VALVE

Patent Pending

The new GUIBERSON Type B Flow Valve, for gas lift, can be used anywhere where flow valves are practical. It is unique in that it operates solely by differential pressures, thus is not affected by velocity of fluid in tubing. Fewer valves of this type than of others are required to obtain the same results. Valves are set for opening and closing differentials on the factory test block. For tubing sizes 1¼" to 3".

VANNE D'ECOULEMENT

Brevet en instance

La nouvelle vanne d'écoulement GUIBERSON de type B, pour levage de gaz, peut s'employer partout où l'emploi de ce type de vannes est pratique. Celle-ci est unique de fait qu'elle fonctionne uniquement par pressions différentielles, de sorte qu'elle n'est pas affectée par la vitesse du fluide dans le tubage. On n'a pas besoin d'autant de vannes de ce type que d'autres pour obtenir les mêmes résultats. Les vannes son réglées pour les différentiels d'ouverture et de fermeture sur le bloc d'essai de la fabrique. Prévue pour calibres de tubage de 1¼ à 3 pouces.

VALVULA DE CORRIENTE

Patente pendiente

La nueva válvula de corriente o flujo GUIBERSON de tipo B, para levantamiento por gas, puede emplearse en todo caso en que una válvula de su tipo resulte conveniente. Es exclusiva en el sentido de que funciona únicamente mediante presiones diferenciales, sin ser afectada por la velocidad del líquido en la tubería. Un menor número de estas válvulas, que las de todo otro tipo, se requieren para obtener los mismos resultados. Las válvulas se regulan para los diferenciales de abertura y de cierre, en el bloque de ensayo de la misma fábrica. Se ofrecen para tubos de 1¼" a 3".

INTERMITTER VALVE

Patent Pending

Like the GUIBERSON Flow Valve, the GUIBERSON Type A Intermitter Valve for gas lift is unique in that it is operated solely by differential pressures. It is an ideal valve to produce oil economically in wells with low fluid level and low bottom hole pressure. Production from low fluid levels is generally increased, due to the fact that unit can be run inside liner and can thus produce directly from the producing formation. Valves are checked on test block at factory for opening and closing differentials.

VANNE INTERMITTENTE

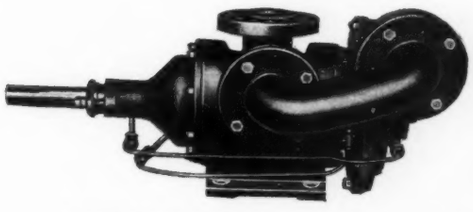
Brevet en instance

De même que la vanne d'écoulement GUIBERSON, la vanne intermittente GUIBERSON de type A pour levée de gaz est unique en ce sens qu'elle fonctionne uniquement par pressions différentielles. C'est une vanne idéale pour produire le pétrole économiquement dans les puits de niveau liquide bas et de faible pression au fond du puits. La production des niveaux liquides bas est en général accrue par suite du fait qu'on peut descendre l'unité à l'intérieur de la chemise et ainsi produire directement sur le gisement. Ces vannes sont vérifiées sur block d'essai à la fabrique pour les différentiels d'ouverture et de fermeture.

VALVULA INTERMITENTE

Patente pendiente

Como la válvula de corriente GUIBERSON, la válvula intermitente GUIBERSON, de tipo A, para levantamiento por gas, es también exclusiva en el sentido de que funciona únicamente mediante presiones diferenciales. Es una válvula ideal para producir el petróleo económicamente en los pozos de nivel líquido bajo y de baja presión al fondo. La producción de los pozos con niveles líquidos bajos es generalmente aumentada debido al hecho de que esta válvula puede bajarse por el interior del forro y producir así directamente del yacimiento. Estas válvulas se verifican en el bloque de ensayo de la fábrica para los diferenciales de abertura y de cierre.



ROTARY PUMP

Patented

The new GUIBERSON Rotary High-Pressure Pump meets the demand of oil field engineers for a pump with high efficiency over a wide range of speeds and pressures. Among the advantages of this pump are: 1. Direct drive by motor or engine, without gears; 2. Fewer wearing parts; 3. Less packing; 4. Adaptable for gasoline or Diesel engine, or electric motor drive; 5. High efficiencies up to 1000 lbs. or more; 6. Operation at sustained high speed; 7. Non-pulsating discharge; 8. No trapping.

POMPE ROTATIVE

Brevetée

La nouvelle pompe rotative de haute pression GUIBERSON répond à la demande des ingénieurs de champs pétroliers pour une pompe de haut rendement offrant une vaste gamme de vitesses et de pressions. Parmi les avantages de cette pompe, on peut citer: 1. Commande directe par moteur ou groupe-moteur, sans engrenages; 2. Moins de pièces qui s'usent; 3. Moins de garniture; 4. Adaptable pour moteur à essence ou Diesel, ou commande de moteur électrique; 5. Hauts rendements jusqu'à 1000 lbs. ou plus; 6. Marche à haute vitesse soutenue; 7. Décharge non-pulsatoire; 8. Pas de trappage.

Voir le catalogue complet GUIBERSON, dans le catalogue combinaison.

BOMBA ROTATIVA

Patentada

La nueva bomba rotativa de alta presión GUIBERSON responde a la demanda de los ingenieros de campos petrolíferos de una bomba de gran rendimiento, con una amplia escala de velocidades y de presiones. Entre las ventajas de esta bomba citamos aquí las siguientes: 1. propulsión directa por motor, sin la intervención de engranajes; 2. Menos piezas expuestas a desgaste; 3. Menos empaquetadura; 4. Adaptable a motor de gasolina o a motor diésel de petróleo, o a motor eléctrico; 5. Alto rendimiento, hasta 1.000 libras o más; 6. Funcionamiento a alta velocidad sostenida; 7. Descarga sin pulsación; 8. No hay retención.

Voir le catalogue complet GUIBERSON, dans le catalogue combinaison.

Sírvase ver el catálogo completo de GUIBERSON, en el catálog de combinación.

PURGING GAS LINES

An unusual cleaning method for gas lines has been developed to overcome difficulties experienced when the usual go-devil was used. Steel shavings are used instead. At regular intervals of 5 miles connections have been installed on the pipe line to permit insertion of the "purge joint." This is a 12-foot piece of pipe of the same diameter as the line. It has a short piece of pipe welded into it at right angles. In preparation for cleaning, a 5-mile section of line between main-line valves is blown down, and then the purge joint is installed in the middle of this section, replacing a nipple of the same length. Steel shavings are introduced into the line through bleed-off valves at the main-line valves. First, the main-line valve 2½ miles upstream from the purge joint is opened and shavings are blown down through the line to be discharged at the purge joint, together with the iron sulfide and other substances dislodged from the pipe walls.

About 2 or 3 bushels of shavings are used for each 2½-mile section. Full line pressure is applied, usually 400 to 500 pounds, blowing the shavings with great velocity. During cleaning, the line superintendent remains at the purge joint and he is in constant telephone communication with men stationed at the main-line valve. When discharge from the purge joint becomes clean, the gas is shut off. A blow of one to two minutes is required and care is exercised to reduce the loss of gas to a minimum.

WAX PLUG TO CLEAN PIPE LINES

Instead of using the common scrapers or go-devils to remove accumulations from pipe lines,

(Continued on Page 298)

raison des ennuis qu'on éprouvait quand on employait le racleur ordinaire dit "go-devil." Au lieu de cela on emploie des copeaux d'acier. A des intervalles réguliers de 5 milles, on a installé sur le pipe-line des raccords pour permettre l'introduction du "joint de purge." Il s'agit d'un morceau de tuyau de 12 pieds de même diamètre que la conduite. Il est pourvu d'un court morceau de tuyau qui y est soudé à angle droit. A titre de préparation pour le nettoyage, on refoule en bas une section de conduite de 5 milles entre les vannes de la canalisation principale, et on installe alors le joint de purge au milieu de cette section, en remplaçant un raccord de la même longueur. On introduit des copeaux d'acier dans la conduite par le moyen de soupapes de trop-plein prévues aux vannes de la canalisation principale. Tout d'abord, on ouvre la vanne de la canalisation principale suitée à 2½ milles en amont du point de purge, et on refoule des copeaux à travers la conduite qui seront déchargés au joint de purge, en même temps que du sulfure de fer et autres substances ainsi détachées des parois de tuyaux.

On emploie environ 2 ou 3 boisseaux de copeaux par section de 2½ milles. On applique la pleine pression de conduite, en général de 400 à 500 lbs., ce qui chasse les copeaux à grande vitesse. Pendant le nettoyage, le surveillant de la conduite se tient au joint de purge et a soin de se tenir en rapport téléphonique constant avec les hommes postés à la vanne de la conduite principale. Quand la décharge au point de purge devient propre, on arrête le gaz. Un soufflage d'une ou deux minutes suffit, mais il faut faire l'opération avec soin pour réduire les pertes de gaz au minimum.

TAMPON DE CIRE POUR NETTOYER LES PIPE-LINES

Au lieu de faire usage des racleurs courants ou "go-devils" pour enlever les accumulations des pipe-lines, ce qui est très difficile dans bien des conduites, on a mis au point une nouvelle méthode de nettoyage qui donne grande satisfaction. On introduit dans la conduite à nettoyer des tampons

(Continué sur Page 298)

instalan en la tubería conexiones que permiten la introducción de "uniones de purga." Esto es un tubo de 12 piés, con diámetro igual al de la tubería. Está provisto de un corto pedazo de tubo, soldado, y dipuesto en ángulo recto. Para la preparación de la limpieza, se sopla bien una sección de 5 millas de la tubería entre las válvulas, y luego se instala la "unión de purga" en la mitad de esta sección, en reemplazo de una conexión de igual longitud. Las virutas de acero se introducen en la tubería por las válvulas de drenaje de que van provistas las válvulas de la tubería principal. En primer lugar, se abre la válvula de la tubería principal, situada a 2½ millas, corriente arriba, del punto de purga, y se soplan ahora las virutas por la tubería. Las virutas son en seguida descargadas por la unión de purga, conjuntamente con el súlfuro de hierro y otras substancias desalojadas de las paredes de la tubería.

Se emplean de 70 a 100 litros de virutas por sección de 2½ millas. Se aplica la presión completa de la línea, generalmente de 400 a 500 libras, lo que sopla las virutas a gran velocidad. Durante la limpieza, el inspector del sistema de tubería permanece en la unión de purga y por comunicación telefónica, da instrucciones a los hombres estacionados en la válvula de la tubería principal. Cuando se presenta limpia la descarga por la unión de purga, se cierra el gas. Una sopladura de uno o dos minutos es suficiente, pero es necesario hacer el trabajo con much cuidado, para reducir a un mínimo las pérdidas de gas.

TAPON DE CERA PARA LIMPIAR TUBERIAS

En lugar de los raspadores corrientes o "go-devils" para quitar las acumulaciones en el interior de las tuberías conductoras, cosa muy difícil en algunas de ellas, se emplea ahora un nuevo método do limpieza, que está dando resultados muy satisfactorios. Tapones de cera, obtenidos de tuberías limpiadas, se introducen en la tubería por limpiarse. Bajo la fuerza de la bomba son lanzados adelante de la corriente de petróleo. La cera se empaca en trozos de 6 a 8 pies de longitud, apisonándose bien con un mazo grueso, y más o

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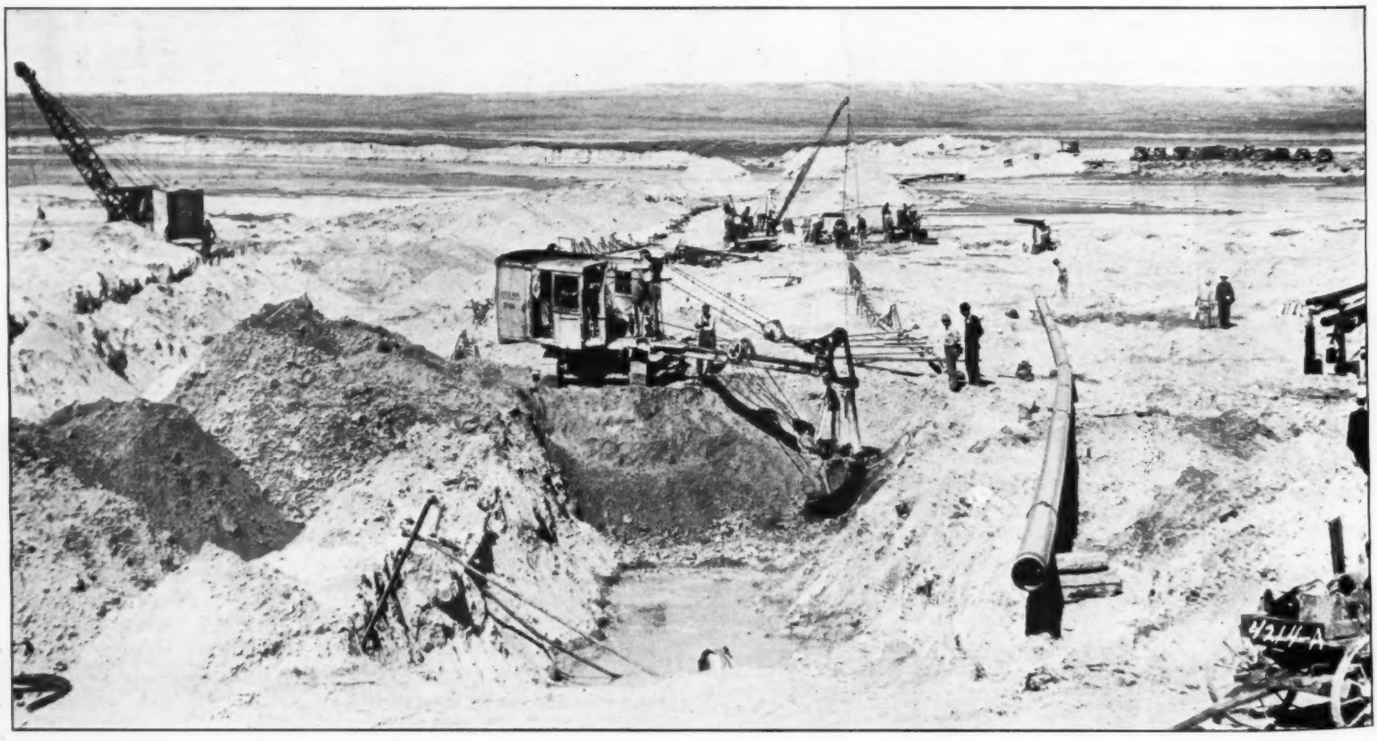


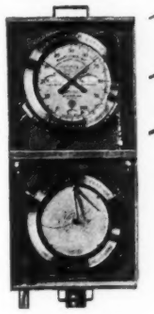
Pipe line river crossings must be anchored securely. Here the pipe trench is being dug below the water level. The water is held out by the strings of well points on either side of the ditcher

A la traversee de rivieres les pipe-lines doivent etre solidement fixes. Ici on est en train de creuser la tranchee de tuyau en-dessous du niveau de l'eau. On tient l'eau a l'ecart par des groupes de butees de puits de part et d'autre du creuse-fosse

Los cruces de rio de la tuberia deben anclarse con seguridad. La zanja para la tuberia se esta excavando aqui debajo del nivel agua. Mediante una ingeniosa disposicion, en cada lado de la zanjadora, se evita la entrada del agua

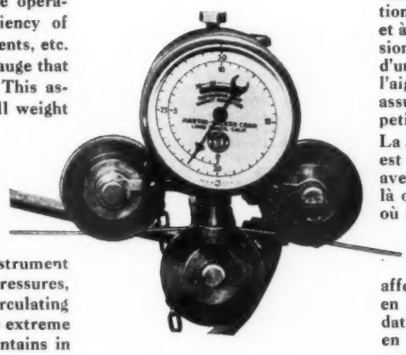
DRILLING CONTROL *The World Over!*

Whether in arctic wastes or tropical jungles oil is where you find it . . . and where you find oil you also find Martin-Decker instruments! The world over they are the foundation for all scientific oil well development. For instance, the QUINTUPLEX, illustrated at right, is universally recognized as the complete drilling control instrument. It centralizes the important drilling functions right under the driller's eyes, keeps a permanent 24-hour record of drilling control, and you will find it used the world over as an outstanding aid to efficient operations.



The CLIPPER is the weight indicating instrument that travels all over the lease at a moment's notice for quick drilling jobs. An ingenious dial arrangement enables it to read directly in pounds or points for practically any string-up with all standard size lines. It has both sensitive and supersensitive gauge hands and is completely self-contained in a tamper-proof, weather-proof, leak-proof case. Weighing only *47 pounds complete*, the Clipper is the ideal instrument for shallow drilling, fishing, production work—in fact, any job where rig-up time is a factor!

This new MEASURING LINE WEIGHT INDICATOR is the instrument that gives positive control to all measuring line operations. It shows continuously the exact tension load on the line *whether the line is moving or at rest.* It assures precision readings on all measuring line operations, and boosts the safety and efficiency of running pressure bombs, survey instruments, etc. It is equipped with a new type Vernier gauge that has 540° travel of the indicator hand. This assures the ultimate in sensitivity to small weight changes!



The UNITIZED MUD PUMP GAUGE is the pressure indicating instrument you want where portability is essential, where installation time is a factor, and where a chart record is not required. It is the most rugged instrument ever built for measuring slush pump pressures, is unaffected by surging pressures or circulating fluids, and is engineered to withstand the extreme vibrations of slush pump system. It contains in one compact unit Diaphragm, Pulsation Damper and Indicator Gauge, and is as easy and quick to install as a bull plug and just as easily moved from rig to rig.

Besides the products described here, Martin-Decker also manufactures the following Weight Recording, Measurement and Control Instruments.

- Weight Indicator
- Vernier Weight Indicator
- Torque Gauge
- Tachometer
- Cement Pump Gauge
- Individual Mud Pump Gauge
- Pump Dynamometer
- Pull Rod Dynamometer
- Rapid Pressure Booster
- Pulsation Damper
- Temperature Bomb

Write for detailed literature, or see the Martin-Decker Section in the Composite Catalog.

Que ce soit dans les solitudes arctiques ou dans la jungle tropicale, le pétrole est là où on le découvre . . . et où on trouve du pétrole exploité, on est sûr aussi d'y trouver les instruments Martin-Decker! Dans le monde entier, ils sont à la base de tout développement scientifique de puits de pétrole. Par exemple, le QUINTUPLEX, qu'on voit à droite, est reconnu universellement comme l'instrument de contrôle de forage *par excellence*. Il met droit sous les yeux du foreur les fonctions de forage importantes, tient un enregistrement permanent de 24 heures du contrôle de forage, et on le trouve d'un emploi général dans le monde comme aide précieuse pour assurer l'efficacité des opérations.

Le CLIPPER est l'instrument indicateur de poids qui se déplace sur toute l'étendue de la concession dès qu'on le demande pour des travaux de forage rapides. Un dispositif ingénieux du cadran permet de faire des lectures directes en livres ou points pour à peu pres toutes les colonnes avec toutes les calibres de cable standards. Il a une aiguille repére sensible et une autre supersensible, et est logé ou complet dans un boîtier inviolable, à l'épreuve du temps et des fuites. Ne pesant *que 47 lbs. au complet*, le Clipper est l'instrument idéal pour forage peu profond, repêchage, travail de production—en fait, toute opération où le temps de mise en train est un facteur!

Ce nouvel INDICATEUR MESUREUR DE POIDS DE CABLE est l'instrument qui assure un contrôle positif à toutes les opérations de mesure de câble. Il montre sans cesse la charge de tension exacte sur le câble, *et cela que le câble soit en mouvement ou immobile*. Il assure des lectures de précision pour toutes les opérations de mesure de câble, et ajoute à la sécurité et à l'efficacité de la descente de bombes de pression, instruments de prospection, etc. Il est muni d'un nouveau type de jauge Vernier dont l'aiguille indicatrice se déplace sur 540°. Ceci assure une sensibilité maximum par rapport aux petites variations de poids!

La JAUGE UNITISEE DE POMPE A BOUES est l'instrument indicateur de pression dont vous avez besoin là où la portabilité est essentielle, là où la durée d'installation est un facteur, et là où on n'a pas besoin d'un enregistrement graphique. C'est l'instrument le plus robuste qu'on ait construit à ce jour pour mesurer les pressions de pompes à boues, il n'est pas affecté par les à-coups de pression ou les fluides en circulation, et peut résister aux fortes trépidations du systéme de pompe à boues. Il contient en une seule unité compacte un diaphragme, un amortisseur de pulsations et une jauge indicatrice, et est d'installation aussi facile et rapide que celle d'un fort tampon et tout aussi facile à passer d'une installation à la suivante.

Outre les articles décrits ici, Martin-Decker fabrique aussi les instruments enregistreurs de poids, de mesure et de contrôle qui suivent:

- Indicateur de poids
- Indicateur de poids Vernier
- Jauge de couple
- Tachymètre
- Jauge de pompe à ciment
- Jauge individuelle de pompe à boues
- Dynamomètre de pompe
- Dynamomètre de tiges de traction
- Renforceur rapide de pression
- Amortisseur de pulsations
- Bombe de température

Demandez notre documentation détaillée, ou voyez la section Martin-Decker dans le Catalogue Combinaison.

Ya en las desoladas regiones árticas, ya en las selvas tropicales, el petróleo está donde se le descubre . . . y donde hay petróleo, bajo explotación, se puede estar seguro de que se hallarán allí también los instrumentos Martin-Decker. En todo el mundo, sirven de base a todo desarrollo científico en la explotación de pozos petrolíferos. Por ejemplo, el QUINTUPLEX, ilustrado a la derecha, es universalmente reconocido como el instrumento de control de perforación *más completo*. Coloca a la vista del perforador todas las funciones importantes de la perforación, mantiene un registro permanente de 24 horas de control de perforación y se le emplea en todo el mundo como una ayuda indispensable para asegurar la eficacia de las operaciones.

El CLIPPER es el instrumento indicador de peso, que viaja por toda la extensión de la concesión, con prontitud, acudiendo a los trabajos de perforación rápidos. Un ingenioso dispositivo de cuadrante permite ontener acusaciones directas en libras o puntos, para casi toda columna con cables de calibres normales. Tiene una aguja indicadora sensible y otra supersensible, y otodo está protegido en una caja inviolable, a prueba de la intemperie y a prueba de escapes. Completo no pesa más de 47 libras. El Clipper es el instrumento ideal para la perforación a poca profundidad, trabajo de pescar, trabajo de producción—en resúmen, para toda operación en que el tiempo de la preparación es un factor importante.

Este nuevo INDICADOR MEDIDOR DE PESO DE CABLE es el instrumento que asegura un control positivo de todas las operaciones de medición de cable. Muestra continuamente la carga de tensión exacta sobre el cable, *ya esté el cable en movimiento, ya en posición fija o inmóvil*. Asegura acusaciones de precisión para todas las operaciones de medición de cable, y propende a aumentar la seguridad y la eficacia de la descensión de bombas de presión, instrumentos de reconocimiento, etc. Está provisto de un nuevo tipo de indicador Vernier, cuya aguja indicadora tiene acción sobre una escala de 540 grados. Esto asegura una sensitividad máxima en relación a pequeños cambios de peso.

El MANOMETRO UNIFICADO DE BOMBA DE LODO es el instrumento indicador de presión que más se requiere en todo caso en que la portabilidad es esencial, en que el tiempo de la instalación es importante y en que no hay necesidad de un registro gráfico. Es el instrumento más firme y durable, de todos los de su clase, construídos hasta ahora, para medir las presiones de las bombas de lodo o barro. No es afectoda por los golpes de presión súbitos ni por los líquidos en circulación, y está proyectado para resistir las violentas trepidaciones del sistema de bomba de lodo. En una sola unidad compacta contiene un diafragma, un amortiguador de pulsaciones y un manómetro indicador. Su instalación es tan fácil y rápida como la de un tapón corriente y es igualmente fácil pasarlo de una instalación a la siguiente.

Además de los artículos aquí anotados, la Martin-Decker fabrica también los instrumentos registradores de peso, de medir de control, que anotamos a continuación:

- Indicador de peso
- Indicador de peso Vernier
- Indicador de esfuerzo de rotación
- Taquímetro
- Manómetro de bomba de cemento
- Manómetro individual de bomba de lodo
- Dinamómetro de bomba
- Dinamómetro de varillas de tracción
- Amplificador rápido de presión
- Amortiguador de pulsaciones
- Bomba de temperatura

Pídanos catálogo descriptivo o sírvase ver la sección de Martin-Decker en el catálogo de combinación.

THE WEIGHT INDICATOR

MARTIN-DECKER CORPORATION

LONG BEACH CALIFORNIA

San Joaquin Valley: A. F. McQUISTON, Bakersfield, California

Mid-Continent Distributor: REED ROLLER BIT COMPANY, Houston, Texas

HERCULES TOOL COMPANY

Manufacturers and Distributors of OIL WELL SPECIALTIES

Figure 103 (Sectional View)

HERCULES MEDIUM PRESSURE CASING HEAD WITH SLIPS

The HERCULES Type A Cast Steel Casing Head is recommended for wells with pressures ranging up to and including 3000 pounds. Slips support the inner or fluid string of casing. ABOVE the slips a seal-tight pack is made by means of steel and rubber packing rings, compressed by a packing nut which screws down into the top of the casing head. IT IS NOT NECESSARY TO LIFT THE CASING OR DISTURB THE WELL CONNECTIONS when repacking the head or when adjusting the pressure on the packing.

This casing head is full opening and is adaptable to the various methods used for connecting up a well. It has two 3" side outlets and can be furnished with tie-down lugs. It is built in all sizes in accordance with A. P. I. specifications. Write for Bulletin 17 which gives complete description and prices. For well pressures up to 7000 pounds we recommend the HERCULES Type B Forged Steel Casing Head, described in Bulletin 18.

TETE DE REVETEMENT DE PRESSION MOYENNE HERCULES AVEC FOURREAUX

La tête de revêtement d'acier coulé HERCULES de type A est recommandée pour des puits de pressions allant jusqu'à 3000 lbs. Les fourreaux soutiennent la colonne de revêtement intérieure ou à liquide. AU-DESSUS DES fourreaux, un bourrage étanche est réalisé au moyen de bagues de garniture en acier et caoutchouc, comprimées par un écrou de bourrage qui appuie en vissant dans le dessus de la tête de revêtement. IL N'EST PAS NECESSAIRE DE LEVER LE REVETEMENT OU DE DERANGER LES RACCORDS DE PUITS quand on regarnit la tête ou quand on règle la pression de la garniture. Cette tête de revêtement est à grande ouverture et adaptable aux diverses méthodes employées pour relier un puits. Elle a deux orifices latéraux de 3 pouces et peut être fournie avec oreilles de fixation. Elle est prévue de toutes les tailles selon les spécifications A.P.I. Demander la notice 17 qui donne la description complète et les prix. Pour des pressions de puits allant jusqu'à 7000 lbs., nous recommandons la tête de revêtement d'acier forgé type B HERCULES décrite dans la notice 18.

CABEZA DE REVESTIMIENTO HERCULES CON SUJETADORES DE PRESION MEDIANA

La cabeza de revestimiento HERCULES de hierro fundido, tipo A, se recomienda para pozos con presiones que lleguen hasta 3.000 libras. La columna interior o líquida de revestimiento queda soportada por sujetadores. ARRIBA de los sujetadores se hace un cierre hermético mediante anillos de acero y de caucho de empaquetadura, todo bien comprimido por una tuerca a propósito que se atornilla en la parte superior de la cabeza de revestimiento. NO ES NECESARIO LEVANTAR EL REVESTIMIENTO O PERTURBAR LAS CONEXIONES DEL POZO para empacar de neuvo la cabeza o para ajustar la presión sobre la impaquetadura. Esta cabeza de revestimiento tiene abertura completa y se adapta a a los varios métodos que se siguen para la conexión de un pozo. Tiene dos salidas laterales de 3" y puede suministrarse con apretadores. Se construye en todo tamaño, de acuerdo con las características de la A.P.I. Pídanos nuestro boletín 17, en que damos información detallada y precios. Para pozos con presiones hasta de 7.000 libras recomendamos la cabeza de revestimiento HERCULES de acero forjado, tipo B, que describimos en nuestro boletín 18.

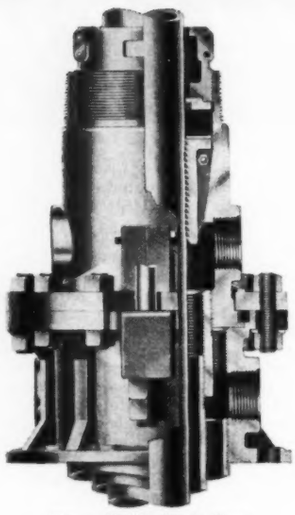


Figure 25 (Sectional View)

HERCULES COMBINATION CASING HEAD WITH SLIPS

The HERCULES Type AFC & FB Casing Head affords several convenient methods for drilling, cementing and connecting up a well. It is a combination casing head which accommodates 3 strings of casing, yet makes a very short hook-up. The combination consists of a bottom section or base into which the outer or surface string of casing is screwed; a special thread collar which affords a means of lowering as well as suspending the second string of casing; and a top section which suspends the inner or fluid string of casing by means of slips, with a seal-tight pack ABOVE the slips. A tight seal is also made between the outer or surface string of casing and the second string of casing by means of the special collar.

The bottom section has a landing thread into which a nipple may be screwed while drilling. This combination casing head is made of electric cast alloy steel and is tested for 3000 pounds pressure. A. P. I. specifications throughout. Write for descriptive Bulletin 32.

TETE DE REVETEMENT COMBINAISON HERCULES AVEC FOURREAUX

La tête de revêtement HERCULES de type AFC et FB offre plusieurs méthodes commodes pour le forage, la cimentation et la liaison du puits. C'est une tête de revêtement combinaison qui reçoit 3 colonnes de revêtement, mais fait un montage très court. La combinaison consiste d'une section de fond ou base dans laquelle la colonne de revêtement extérieure ou de surface se visse; un collier spécial à filetage qui offre un moyen de descendre et de suspendro la 2ème colonne de revêtement; et une section de sommet qui suspend la colonne de revêtement intérieure ou à liquide au moyen de fourreaux, avec un bourrage étanche AU-DESSUS des fourreaux. Un joint étanche est aussi réalisé entre la colonne de revêtement extérieure ou de surface et la 2ème colonne de revêtement au moyen du collier spécial.

La section de fond a un filetage de pose dans lequel on peut visser un raccord pendant le forage. Cette tête de revêtement combinaison est en acier spécial coulé type électrique et est éprouvée sous 3000 lbs. de pression. Rien que des spécifications A.P.I. Notice 32 descriptive sur demande.

CABEZA DE REVESTIMIENTO HERCULES DE COMBINACION CON SUJETADORES

La cabeza de revestimiento HERCULES de tipo AFC & FB, facilita varios convenientes métodos de perforar, cementar y conectar el pozo. Es una cabeza de revestimiento de combinación, que admite 3 columnas o series de revestimiento, requiriendo, para todo, una conexión muy corta. La combinación consiste en una sección de fondo o base, en la cual se atornilla la columna de revestimiento exterior o de superficie; un collar roscado especial, que representa un medio de bajar, lo mismo que de suspender, la columna de revestimiento interior o líquido, con sujetadores, habiendo una empaquetadura de cierre hermético ARRIBA de los sujetadores. También se hace un cierre hermético entre la columna de revestimiento exterior y la segunda columna de revestimiento, mediante un collar especial.

La sección del fondo tiene una rosca de conexión en la cual puede atornillarse una pieza de acoplamiento mientras se está perforando. Esta cabeza de revestimiento de combinación se hace de aleación de acero fundida por procedimiento eléctrico y está ensayada a 3.000 libras de presión. Construída conforme las características de la A.P.I. Pídanos nuestro boletín descriptivo 32.

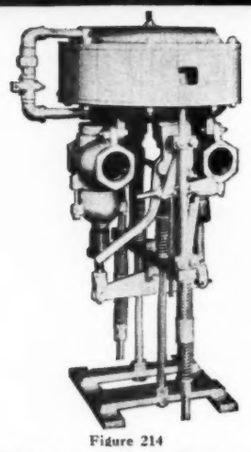


Figure 214

HERCULES ENGINE-CONTROL VALVE FOR PROTECTING PUMPING ENGINES

When equipped with the HERCULES Engine-Control Valve, a pumping engine CANNOT INCREASE ITS SPEED if the well pumps off or if the sucker rods break—the cooling system CANNOT FREEZE if the water pump fails or if the engine stops—the engine CANNOT OVERHEAT if its water pump fails.

The valve is set for any desired engine speed and thereafter functions AUTOMATICALLY. It is connected with the fuel and water lines and is balanced with the pressure in the engine's water pump. As long as the engine runs normally, keeping the water pressure constant, the valve remains open. But any variation in pressure will close the valve, which in turn stops the engine, drains the water and shuts off the fuel.

Because it requires no attention after installation, the HERCULES Engine-Control Valve enables ONE MAN to supervise SEVERAL WELLS which are located far apart. It eliminates the expense of hiring one pumper for each well. The valve is approximately 30" high and 20" wide over-all. For full description and prices, write for Bulletin 22.

VANNE DE CONTROLE DE MOTEUR HERCULES POUR LA PROTECTION DES MOTEURS DE POMPAGE

Quand un moteur de pompage est muni de la vanne de contrôle de moteur HERCULES, il NE PEUT PAS AUGMENTER SA VITESSE si le puits relentit ou si les tiges aspiratrices viennent à se rompre—le système de refroidissement NE PEUT GELER si la pompe à eau a une panne ou si le moteur s'arrête—le moteur NE PEUT S'ECHAUFFER si sa pompe à eau a une panne.

La pompe est réglée pour toute vitesse de moteur désirée et fonctionne alors AUTOMATIQUEMENT. Elle est reliée aux conduites à carburant et à eau et est équilibrée avec la pression dans la pompe à eau du moteur. Tant que le moteur marche normalement, maintenant la pression d'eau constante, la vanne reste ouverte. Mais toute variation de pression fermera la vanne, ce qui aura pour effet d'arrêter le moteur, de vidanger l'eau et d'exclure le carburant.

Etant donné que la vanne à contrôle de moteur HERCULES ne demande aucun soin après avoir été installée, UN SEUL HOMME suffit pour surveiller PLUSIEURS PUITS assez éloignés entre eux. Elle supprime les frais de location d'un pompeur pour chaque puits. Cette vanne a environ 30 pouces de haut et 20 pouces de large hors-tout. Pour description complète et prix, demander la notice 22.

VALVULA HERCULES DE REGULACION DE MOTOR PARA PROTEGER LOS MOTORES DE LAS BOMBAS

Cuando está equipada con una válvula HERCULES de regulación de motor, la bomba aspirante NO PUEDE AUMENTAR SU VELOCIDAD si el pozo se agota o si se rompen las varillas de aspiración—el sistema de enfriamiento NO PUEDE CONGELARSE si falla la bomba de agua o si se para el motor—el motor NO PUEDE RECALENTARSE si le falla su bomba de agua.

La válvula se ajusta a cualquiera velocidad de motor que se quiera, y después de este ajuste, funciona AUTOMATICAMENTE. Se conecta con las tuberías del combustible y agua y se compensa con la presión en la bomba de agua del motor. Mientras el motor fucione normalmente, conservándose constante la presión del agua, la válvula permanece abierta. Cualquiera variación en presión cerrará la válvula, la cual, a su turno, para el motor, permite la salida del agua y cierra el combustible.

A causa de que no requiere atención, despues de instalada, la válvula HERCULES de regulación de motor permite que un hombre solo vigile VARIOS POZOS a buena distancia entre sí. Ahorra el gasto de tener un hombre a cargo de la bomba de cada pozo. La válvula tiene como 30" de altura y 20" de anchura. Descripciónde-tallada y precios, en nuestro boletín 22.

Figure 204 (Sectional View)

HERCULES HIGH PRESSURE TUBING HEAD WITH SLIPS

The HERCULES Type C-3 Forged Steel Tubing Head is designed for supporting the tubing in extra-deep wells where pressures range up to and including 5000 pounds. A seal-tight pack is made ABOVE the slips. With this arrangement the packing can be further compressed, or taken out and the head repacked, WITHOUT LIFTING THE TUBING OR DISTURBING THE WELL CONNECTIONS.

Type C-3 is actually a COMBINATION casing head and tubing support. The threaded connection between the packing bowl (top section) and the casing head (bottom section) WILL NOT LEAK. Tools can be run into the well simply by unscrewing the packing bowl (top section). This tubing head can be furnished either with slips or mandrel. It is manufactured in all sizes in accordance with A. P. I. specifications. For complete description and prices, write for Bulletin 9.

TETE DE TUBAGE DE HAUTE PRESSION HERCULES AVEC FOURREAUX

La tête de tubage en acier forgé HERCULES de type C-3 est conçue pour soutenir le tubage dans des puits extra-profonds où les pressions vont jusqu'à 5000 lbs. compris. Une garniture étanche est prévue AU-DESSUS des fourreaux. Au moyen de ce dispositif, on peut comprimer encore plus la garniture, ou l'extraire et regarnir la tête, SANS AVOIR A LEVER LE TUBAGE OU DERANGER LES RACCORDS DE PUITS.

Le type C-3 est en fait une COMBINAISON de support de tête de revêtement et de tubage. La raccord fileté entre la cuvette de garniture (section de sommet) et la tête de revêtement (section de base) EST ANTI-FUITE. Les outils peuvent être descendus dans le puits simplement en dévissant la cuvette de garniture (section de sommet). Cette tête de tubage peut être fournie soit avec fourreaux, soit avec mandrin. Elle est prévue de toutes les tailles selon les spécifications A.P.I. Pour description complète et prix, demander la notice 9.

CABEZA DE TUBERIA HERCULES CON SUJETADORES DE ALTA PRESION

La cabeza de tubería HERCULES de acero forjado, tipo C-3, sirve para soportar la tubería en pozos bien profundos, en los cuales la presión llega hasta 5.000 libras. Se hace un cierre hermético ARRIBA de los sujetadores. Con esta disposición, la empaquetadura puede comprimirse más aún, o quitarse para empacar de nuevo la cabeza, SIN NECESIDAD DE LEVANTAR LA TUBERIA O DE PERTURBAR LAS CONEXIONS DEL POZO.

El tipo C-3 es en realidad una cabeza de revestimiento de COMBINACION y soporte de tubería. La conexión roscada entre la cámara de empaquetadura (sección superior) y la cabeza de revestimiento (sección inferior) NO PERMITE NINGUN ESCAPE. Las herramientas pueden introducirse en el pozo sencsillamente destornillando la cámara de empaquetadura (sección superior). Esta cabeza de tubería puede suministrarse con sujetadores o con mandriles. Se ofrece en todo tamaño, de acuerdo con las características de la A.P.I. Para información completa y precios, pídanos nuestros boletín 9.

TULSA, OKLAHOMA, U.S.A.

Post Office Box 286 — Cable Address: HERTOCO — Write for Bulletins and Prices

HERCULES TOOL TULSA

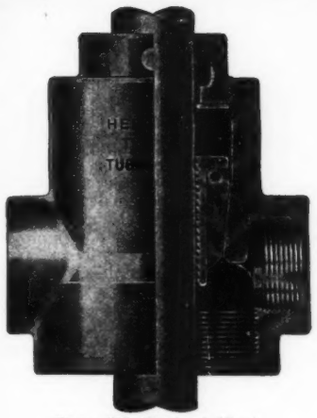


Figure 208 (Sectional View)

HERCULES MEDIUM PRESSURE TUBING HEAD WITH SLIPS

The HERCULES Type D-4 Cast Steel Tubing Head provides a very short but complete hook-up for pumping or flowing wells. Actually a one-piece COMBINATION tubing support and casing head, it eliminates the need for a Berry pattern casing head. Any size tubing from 3" upset down to 2" or smaller can be supported by the head, simply by changing parts.

Like all HERCULES Casing Heads and Tubing Heads, the Type D-4 has its packing ABOVE the slips. This HERCULES arrangement protects the packing from cutting out or breaking down; permits pressure adjustment on the packing merely by turning packing nut; permits repacking WITHOUT LIFTING THE PIPE OR DISTURBING THE WELL CONNECTIONS.

The HERCULES Type D-4 is an excellent tubing head for use in acidizing wells. It is tested for 2000 pounds pressure and is built in all sizes in accordance with A. P. I. standards. Write for Bulletin 11 which gives full description and prices.

TETE DE TUBAGE DE PRESSION MOYENNE HERCULES AVEC FOURREAUX

La tête de tubage d'acier coulé HERCULES de type D-4 fournit un montage très court mais complet pour le pompage ou l'écoulement de puits. En fait une COMBINAISON d'une seule pièce de support de tubage et de tête de revêtement, elle élimine le besoin d'une tête de revêtement de type Berry. Tout calibre de tubage depuis 3 pouces de renfort jusqu'à 2 pouces ou moins peut être soutenu par cette tête, par un simple changement de pièces.

De même que toutes les têtes de revêtement et les têtes de tubage HERCULES, le type D-4 a sa garniture placée AU-DESSUS des fourreaux. Ce dispositif HERCULES met la garniture à l'abri des coupures ou ruptures; il permet le réglage de la pression sur la garniture en tournant simplement l'écrou de garniture; il permet aussi de regarnir SANS DEVOIR LEVER LE TUYAU OU DERANGER LES RACCORDS DE PUITS. Le type D-4 HERCULES est une excellente tête de tubage pour emploi dans le traitement acide des puits. Il est éprouvé sous 2000 lbs. de pression et est prévu dans toutes les tailles en conformité avec les standards de A.P.I. Demandez-nous la notice 11 qui en donne une description complète avec prix.

CABEZA DE TUBERIA HERCULES CON SUJETADORES DE PRESION MEDIANA

La cabeza de tubería HERCULES de acero fundido, tipo D-4, provee una conexión muy corta, pero completa, para el bombeo de pozos. Como es, en realidad, una COMBINACION enteriza de soporte de tubería y cabeza de revestimiento, evita la necesidad de una cabeza de revestimiento de modelo Berry. Cualquiera tubería de 3" a 2 o menor, puede ser soportada por esta cabeza sencillamente cambiando las piezas.

Como todas las cabezas de revestimiento y cabezas de tubería HERCULES, el tipo D-4 tiene su empaquetadura ARRIBA de los sujetadores. Este rasgo de la HERCULES proteje la empaquetadura contra la rotura o separación, permite el ajuste de la presión sobre la empaquetadura sencillamente girando la tuerca de la empaquetadura, y y facilita la instalación de nueva empaquetadura SIN LEVANTAR LA TUBERIA O PERTURBAR LAS CONEXIONES DEL POZO.

El tipo D-4 de cabeza de tubería HERCULES es excelente para el tratamiento con ácido del pozo. Está ensayada a 2.000 libras de presión y se construye en todo tamaño, de acuerdo con las normas de la A.P.I. Pídanos nuestro boletín No. 11 en que damos descripción detallada y precios.

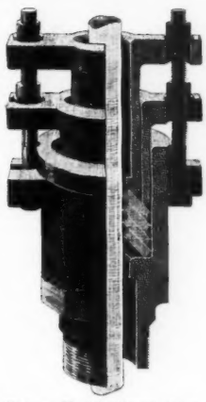


Figure 29 (Sectional View)

THE HERCULES SUPER-PACK POLISH ROD STUFFING BOX

The HERCULES Duplex Polish Rod Stuffing Box has introduced an entirely new departure in the method of packing. The packing will last from 3 TO 6 MONTHS on wells requiring repacking every few days with the conventional type of stuffing box. When first installed, only the edges of the 4 special packing rings will contact the polish rod (see illustration). Soon, however, the edges will wear down, permitting the entire thickness of the packing to contact the polish rod, and forming a perfect seal. The packing polishes and glazes the rod even when the rod is rough and pitted.

This stuffing box makes a perfect pack with any size of polish rod and with any length and any frequency of strokes. Furthermore, the packing won't burn out on wells periodically pumping off, because the packing absorbs enough oil to lubricate the polish rod even while no fluid is being lifted. The HERCULES Stuffing Box is made in all sizes. For complete description and prices, write for Bulletin 30.

LE PRESSE-ETOUPE DE TIGES POLIES "SUPER-PACK" HERCULES

Le presse-étroupe de tiges polies "Duplex" HERCULES a introduit une innovation radicale dans le mode de bourrage. La garniture durera de 3 A 6 MOIS sur les puits demandant à être regarnis tous les quelques jours avec le type courant de presse-étoupe. Lors de la première installation, seuls les bords des 4 bagues de garniture spéciales viendront en contact avec la tige polie (voir cliché). Bientôt, toutefois, les bords s'useront, ce qui permettra à toute l'épaisseur de la garniture de prendre contact avec la tige polie et ainsi de former un joint parfait. La garniture polit et fait briller la tige même quand cette tige est rugueuse et piquée.

Ce presse-étoupe fait un bourrage parfait avec toute taille de tige polie et avec toute longueur et toute fréquence de courses. En outre, la garniture n'est pas apte à brûler sur des puits périodiquement en panne car la garniture absorbe assez d'huile pour graisser la tige polie même pendant la période où on ne pompe pas. Le presse-étoupe HERCULES est prévu de toutes les tailles. Pour la description complète et les prix, nous demander notre notice 30.

LA CAJA DE EMPAQUETADURA HERCULES SUPER-PACK DE VARILLA PULIDA

La caja de empaquetadura HERCULES Duplex de varilla pulida ha introducido una interesante innovación en método de empaquetadura. La empaquetadura dura de 3 A 6 MESES en los pozos que requieren renovación de empaquetadura después de unos pocos días con la caja de empaquetadura de tipo ordinario. Cuando se instala al principio, sólo los bordes de los cuatro anillos especiales de empaquetadura tienen contacto con la varilla pulida (como se ve en el grabado). Los bordes, dentro de poco, se desgastan, permitiendo que el espesor completo de la empaquetadura quede en contacto con la varilla pulida, formando un cierre perfecto. La empaquetadura pule y glasea la varilla, aun cuando ésta esté áspera o picada.

Esta caja de empaquetadura asegura un cierre perfecto a cualquier tamaño de varilla pulida, sujeta a carrera de cualquiera distancia o frecuencia. Por otra parte, la empaquetadura no se quema en aquellos pozos que se agotan periodicamente, a causa de que la misma empaquetadura absorbe suficiente petróleo para lubricar la varilla pulida, aun cuando no haya corriente de líquido. La caja de empaquetadura HERCULES se ofrece en todo tamaño. Para información detallada y precios, pida nuestro boletín 30.

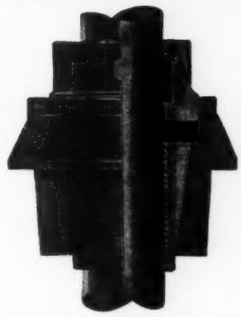


Figure 10-A (Sectional View)

HERCULES TUBING HANGER—FOR USE IN BERRY PATTERN CASING HEADS

The HERCULES Tubing Hanger offers a number of exclusive advantages. The forged steel slips completely encircle the tubing and will not pinch or crush it. A rubber packing ring directly ABOVE the slips is distorted by the packing nut which screws down into the top of the hanger body, forming a gas-tight seal. The slips are held firmly in place by the downward pressure exerted on the packing, making it impossible for them to jump out if the rods break or drop.

The body of the HERCULES Tubing Hanger is made of forged steel, which is light in weight but of sufficient strength to support several times the weight of the longest string of tubing. The Hanger sits down into the Berry pattern casing head, extending only 1 to 5 inches above the top. Thus it does not interfere with pumping equipment above the well.

The HERCULES Tubing Hanger is made in all sizes to fit any make of Berry pattern casing head. A. P. I. specifications. Write for Bulletin 1 which gives complete description and prices.

SUSPENDEUR DE TUBAGE HERCULES — POUR EMPLOI SUR TETES DE TUBAGE DE TYPE BERRY

Le suspendeur de tubage HERCULES offre plusieurs avantages exclusifs. Les fourreaux en acier forgé entourent complètement le tubage et ne risquent pas de le pincer ou de l'écraser. Une bague de garniture en caoutchouc immédiatement AU-DESSUS des fourreaux est déformée par l'écrou de bourrage qui serre en se vissant dans le dessus du corps de suspendeur, d'où un joint étanche au gaz. Les fourreaux sont maintenus fermement en place par la pression dirigée vers le bas exercée sur la garniture, ce qui ne leur permet pas de sortir si les tiges viennent à casser ou à tomber.

Le corps du suspendeur de tubage HERCULES est en acier forgé, qui est léger mais de force suffisante pour supporter plusieurs fois de la plus longue colonne de tubage. Le suspendeur vient reposer dans la tête de revêtement de type Berry, dépassant seulement de 1 à 5 pouces au-dessus du sommet. Ainsi il ne gêne pas avec le matériel de pompage au-dessus du puits.

Le suspendeur de tubage HERCULES est prévu de toutes les tailles pour s'adapter à toute marque de tête de revêtement de type Berry. Spécifications de A.P.I. Demandez-nous la notice 1 que en donne une description complète avec prix.

COLGADOR DE TUBERIA HERCULES—PARA EMPLEARSE EN CABEZAS DE REVESTIMIENTO DE MODELO BERRY

El colgador de tubería HERCULES ofrece varias ventajas exclusivas. Los sujetadores de acero forjado rodean completamente el tubo, sin apretarlo ni aplastarlo. Una empaquetadura anular de caucho inmediatamente ARRIBA de los sujetadores se deforma por la tuerca de empaquetadura, que se atornailla en la parte superior del cuerpo del colgador, formando un cierre hermético al gas. Los sujetadores se mantienen bien asegurados en sus sitios por la presion descendente ejercida sobre la empaquetadura, lo que hace imposible su desprendimiento en caso de que las varillas se rompan a caigan.

El cuerpo del colgador de tubería HERCULES se hace de hierro forjado, liviano en peso, pero de suficiente firmeza para soportar varias veces el peso de la columna de tubos más larga. El colgador descansa dentro de la cabeza de revestimiento de modelo Berry, sobresaliente de ella, por arriba, sólo de 1 a 5 pulgadas. Por esta razón, no perturba el funcionamiento del equipo de bomba encima del pozo.

El colgador de tubería HERCULES se hace de todo tamaño para adaptarse a cualquier marca de cabeza de revestimiento de modelo Berry. Características A.P.I. Pida nuestro boletín 1, en el cual damos información detalla y precios.

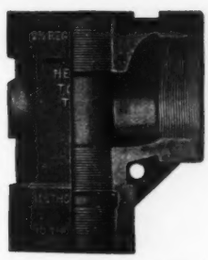


Figure 250 (Sectional View)

HERCULES COMBINATION THREAD PUMPING AND FLOWING TEE

The HERCULES Combination Thread Tee —for pumping and flowing wells—can be used on EITHER regular or upset thread tubing. It makes a shorter connection by eliminating the swage nipple for reducing from an upset to a regular thread.

This tee has an upset and regular thread in the bottom to screw onto the tubing; a regular thread in the top for stuffing box or other connection; a 90-degree side outlet for lead or flow line (all 2½" tees have a 3" side outlet); a 1" opening in the back side for a bleeder valve or pressure gauge. The tee is regularly furnished with either a 10 or 11½ upset thread, but can also be furnished with British Standard thread, standard 8 thread, or National Round Drill Pipe 8 thread.

The HERCULES Combination Thread Pumping and Flowing Tee is made of nickel chrome steel and is tested for 3000 pounds pressure. Furnished in all sizes. A. P. I. specifications. For complete description and prices, write for Bulletin 2.

TE FILETE COMBINAISON HERCULES POUR POMPAGE ET ECOULEMENT

Le té fileté combinaison HERCULES—pour le pompage et le jaillissement de puits—peut être employé SOIT sur tubage normal, soit sur tubage à filetage renforcé. Il fait un raccord plus court en supprimant le raccord estampé pour réduire depuis un filet renforcé jusqu'à un filet normal.

Ce té a un filetage renforcé et un régulier à la base pour se visser sur le tubage; un filetage normal au sommet pour le presse-étoupe ou autre raccord; un orifice latéral à 90 degrés pour conduite guide ou d'écoulement (tous les tés de 2½ pouces ont un orifice latéral de 3 pouces); une ouverture de 1 pouce sur le côté arrière pour une soupape de décharge ou un manomètre. Le té est fourni régulièrement avec un filetage renforcé soit de 10 soit de 11½, mais peut aussi être fourni avec filetage standard anglais, filetage standard de 8, ou filetage de 8 national de tuyau forage rond.

Le té fileté combinaison HERCULES de pompage et d'écoulement est en acier au nickel-chrome et est éprouvé sous pressions de 3000 lbs. Fourni de toutes les tailles. Spécifications de A.P.I. Pour description complète et prix, demander notre notice 2.

CONEXION EN T HERCULES ROSCADA DE COMBINACION PARA BOMBEO Y CORRIENTE NATURAL

La conexión en T HERCULES roscada de combinación, para el bombeo y corriente natural de pozos, puede emplearse en tubería roscada normal o recortada. Permite una conexión más corta eliminando la unión tubular de doble rosca para la reducción de rosca recortada a rosca corriente.

Esta conexión en T tiene una rosca recortada y corriente al fondo, para su atornilladura en la tubería; una rosca corriente arriba, para la caja de empaquetadura u otra conexión; una salida lateral de 90 grados, para tubería de salida natural (todas las conexiones en T de 2 1/2" tenen una salida lateral de 3"); una salida de 1 pulgada por la parte de atrás, para una válvula de drenaje o manómetro de presión. Esta conexión se suministra normaliente con rosca recortada de 10 o de 11½, pero puede también suministrarse con rosca normal inglesa, normal de 8 o rosca de 8 de tubo cilíndrico de perforación National.

La conexión en T HERCULES roscada de combinación, para el bombeo y corriente natural de pozos, se hace de aleación de acero al cromo y níquel y se ensaya a 3.000 libras de presión. Se suministra en todo tamaño, con caracteristicas según las normas de la A.P.I. Para descripción completa y precios, pídanos nuestro boletín 2.

which in many lines is very difficult, a new cleaning method has been developed which is giving satisfaction. Plugs of wax obtained from cleaned pipe lines have been inserted in the line to be cleaned and pumped ahead of the stream of oil. The wax is packed into a length of 6 to 8 feet by ramming with a stout club, inserting every foot or so a circle of cardboard the diameter of the pipe. This seems to help shape the wax into a good piston.

The pump, after flanging up, shoves this wax plug along the line, causing any deposit in the pipe to move ahead of it. If the accumulation is enough to cause the pressure at the pump to rise to the maximum and there is practically no movement of fluid, then the line must be opened to let out some of this accumulation. This is done by putting on a hot tap, say 2 inches. The location of the plug can be determined closely by the volume of oil the pump has displaced, this being translated into distance along the pipe line. The hot tap is placed some hundreds of feet in advance of the place where the plug is thought to be located. The pressure again is put on and the accumulated wax forced through a swing pipe on the tap into dump-trucks to be hauled away.

This method of cleaning pipe lines was developed after watching the exit of scrapers from pipe lines. Long before the scraper actually left the bypass a large amount of wax and other sediments was forced out of the line. When the scraper did appear it was so buried in wax as to be difficult to recognize. It became apparent that if the plug of wax could be forced through the pipe line it would clean the inside of the pipe quite satisfactorily because the metal scraper did not reach the dirty part of the line until some time after the wax plug ahead of it had passed. So why not use the wax plug alone? Where lines are built to be cleaned with the conventional scraper it is just as well to use it, for it does have some advantages; but there are many pipe lines not so laid as to make the use of metal scrapers easy, and for such lines the wax plug fills a need.

RECONDITIONING PIPE

The practice of removing old pipe to central reconditioning yards has been expanded and a great deal of this work has been done in the past year. The work has been found quite profitable and much of the old pipe has been reclaimed and made suitable for further use.

The general scheme is first to check along the line for possible "hot spots" or badly corroded areas and then to open the ditch, usiing ditching machines and hand shoveling. The pipe is lifted out of the ditch in lengths after couplings have been split with a cutting-torch. Most of the old lines were of the screwed-coupling type and this is one of the reasons the pipe is being taken up and reconditioned to make it ready for relaying and welding.

As the lengths of pipe are taken from the ditch they are hauled to the central pipe yard where they are rolled onto skids for inspection and sorting. Pipe free of obstructions is sent direct to the pipe-cleaning machine, where the rust and protective coating material and paper are removed and the bare pipe is made ready for the further inspection of special men. The next thing is to determine the actual condition of the pipe, the extent of corrosion areas, the depth gauges and acetylene burning torches so that the end products of corrosion left in the pits can be burned and then easily swept out.

The inspectors indicate by a ring of chalk the places to be filled by welding metal and the welders fill such pits to over-flow. The welders are followed by a gang equipped with portable grinder

de cire obtenus de pipe-lines nettoyés par pompage effectué en avance sur le flot de pétrole. On tasse la cire de façon à constituer une longueur de 6 à 8 pieds en tamponnant au moyen d'une grosse massue, en introduisant à chaque de distance environ un cercle de carton d'un diamètre ègal à celui du tuyau. Ceci semble favoriser la formation par la circe d'un bon piston.

La pompe, après accouplement, pousse ce tampon de circe le long de la conduite, obligeant tout dépôt à l'intérieur du tuyau à le précéder. Si l'accumulation est telle qu'elle amène la pression à la pompe à atteindre le maximum et qu'il n'y ait plus pour ainsi dire de circulation du liquide, il faut alors ouvrir la conduite pour laisser sortir une partie de cette accumulation. On réalise cela en montant sur la conduite un robinet à chaud, disons un de 2 pouces. On peut déterminer de près l'emplacement du tampon par le volume de pétrole que la pompe a déplacé, ce qu'on peut facilement traduire en distance le long du pipe-line. On place le robine à chaud à quelques centaines de pieds en avance de l'endroit où l'on croit que se trouve le tampon. On réapplique la pression et la cire accumulée est forcée à travers un tuyau pivotant sur le robinet dans des camions à benne basculante qui en font le transport.

C'est en observant la sortie des racleurs des pipe-lines qu'on a conçu cette méthode de nettoyage des pipe-lines. Longtemps avant que le racleur ait quitté vraiment la dérivation, une forte quantité de cire et d'autres sédiments était chassée hors de la conduite. Quand le racleur faisait enfin son apparition, il était tellement enterré dans la cire qu'il était difficile de le reconnaître. Il devint évident que si l'on pouvait refouler le tampon de cire à travers le pipe-line, ce tampon nettoierait l'intérieur du tuyau d'une manière très satisfaisante car le racleur de métal ne parvenait à la partie sale de la conduite que quelque temps après le tampon de cire qui le devançait. On se dit alors: Pourquoi n'emploierait-on pas le tampon de cire tout seul? Dans le cas de conduites prévues pour être nettoyées avec le racleur courant, autant l'employer, car ce procédé a certains avantages; mais il existe de nombreux pipe-lines qui ne sont pas d'un type rendant très facile l'emploi de racleurs en métal, et dans le cas de ce genre de conduites le tampon de cire réspond au besoin.

REFECTION DE CANALISATION

La pratique de remettre en état d'anciens tuyaux dans des chantiers de réfection centraux s'est répandue et elle est devenue très courant au cours de l'an dernier. On a trouvé un profit réel à effectuer ce travail et une bonne partie des vieux tuyaux a été régénérée et rendue apte à reprendre le service.

La méthode générale consiste tout d'abord à chercher tout le long de la conduite ce qu'on appelle les 'points qui brûlent" possibles ou endroits sérieusement corrodés, puis à ouvrir la tranchée à ces endroits, en employant des machines à creuser et des pelles à main. On soulève le tuyau hors de la tranchée par longueurs après qu'on a trancher les raccords au chalumeau à découper. La plupart des anciens pipe-lines étaient du type à raccords vissés et c'est là une des raisons pour lesquelles on extrait le tuyau et on le rénove pour le rendre apte à la repose et au soudage.

Après qu'on a sorti de la tranchée les longueurs de tuyau, on les transporte au chantier central de tuyaux où on les fait rouler sur des patins pour leur faire subir une inspection et un triage. Tout tuyau exempt d'obstructions est envoyé directement à la machine à nettoyer les tuyaux, qui enlève la rouille ainsi que l'enduit et papier protecteurs, et le tuyau ainsi mis à nu est préparé pour l'inspection nouvelle de spécialistes. Il s'agit ensuite de déterminer l'état réel du tuyau, le degré de corrosion des divers endroits, les calibres de profondeur et les chalumeaux à acétylène, et cela afin que les produits de corrosion restant en dernier dans les piqûres puissent être brûlés et facilement balayés.

Les inspecteurs indiquent au moyen d'un cercle à la craie les endroits qu'il convient de combler de métal de soudure et les soudeurs remplissent ces piqûres jusqu'à ras. Les soudeurs sont suivis d'une équipe munie de meules rectifieuses portatives. Ces derniers nivèlent le métal en excès et examinent alors la soudure pour être sûrs qu'il n'y ait pas de fissures ou de défauts. Si la soudure n'est pas parfaite, on la fait de nouveau.

Le tuyau a été biseauté pour emploi dans la

menos, a cada pié, sé inserta en ella un disco de cartón del diámetro de la tubería, lo que tiende a mantenerla en la forma de un buen émbolo.

La bomba, después de acoplada, empuja el tapón de cera por la tubería, haciendo que todas las acumulaciones en el interior del conducto se muevan adelante del tapón. Cuando la acumulación es suficiente para exigir que la bomba funcione a su presión mámima, y no se efectúa casi ningún movimiento de líquido, hay entonces que abrir la tubería para dar salida a parte de esta acumulación. Esto se hace montando un grifo a propósito, 2 pulgadas, por lo general. Se puede determinar aproximadamente la posición del tapón por la cantidad de petróleo que la bomba ha desplazado; ésto, a su turno, se traduce fácilmente en distancia a lo largo de la tubería. El grifo de salida se coloca a varios centenares de pies adelante del punto en que se supone que esté el tapón. Se aplica de nuevo la presión y la cera acumulada es obligada a salir por un tubo pivoteado en el grifo, cayendo en camiones con cajas basculantes, que se encargan de su transporte.

Este método de limpiar tuberías fué desarrollado después de observar la salida de los raspadores de las tuberías limpiadas. Mucho antes de la salida del mismo raspador de la derivación, se observaba que una gran cantidad de cera y de otros sedimentos se habián escapado de la tubería. Cuando finalmente salía el respador, se veía tan cubierto de cera que era difícil reconocerlo. Se hizo entonces evidente que si el tapón de cera pudiera moverse en la tubería, limpiaría el interior de ella de una manera muy efectiva, en vista de que el raspador metálico no llegaba a la parte sucia de la línea sino algún tiempo después de que el tapón de cera, que llevaba adelante, la había ya pasado. Se dijo entonces Porqué no emplear el tapón de cera unicamente? En el caso de tuberías conductoras preparadas para ser limpiadas con raspador de tipo corriente, conviene, por supuesto, emplear semejante herramienta, pues representa un procedimiento ventajoso. Hay, sin embargo, muchas tuberías conductoras que no están adaptadas a su fácil o conveniente limpieza con raspadores metálicos, y en tales casos, el tapón de cera resulta muy adecuado a la necesidad de un método más fácil efectivo.

REACONDICIONAMIENTO DE TUBOS

La práctica de enviar los tubos viejos a establecimiento centrales de reacondicionamiento o rehabilitación se ha difundido rápidamente y durante en año pasado se hizo mucho trabajo de esta clase. Se ha visto que este en un negocio muy lucrativo y por esta razón, una estadid de tubería vieja ha sido renovada y dedicada de nuevo al servicio.

El método general es primero buscar, a lo largo de la línea, puntos en mal estado o secciones muy corroídas, y luego abrir la zanja, empleando ex cavadoras y palas manuales. La tubería, en los lugares afectados, se extrae de la zanja en secciones, después de separar sus acoplamientos con sopletes cortadores. Casi todas las tuberías antiguas son del tipo de acoplamiento atornillado, y ésta es una de las principales razones que justifican su extracción para ser renovadas y utilizadas de nuevo.

Después de quitadas de las zanjas, las secciones de tubería se transportan al establecimiento central de reacondicionamiento, donde se colocan en patines y someten a inspección y clasificación. El tubo exento de obstrucción es enviado directamente a la máquina limpiadora de tubos, la cual le quita el moho, revestimiento protectivo y envolutra de papel, dejándolo desnudo y listo para adicional inspección por inspectores especialistas. El paso general siguiente es determinar el verdadero estado del tubo, la extensión de las superficies corroídas y ver qué calibres de profundidad y sopletes de acetileno se necesitan a fin de desalojar por quemadura y sopladura los productos de la corrosión restantes en lar picaduras del tubo.

Los inspectores señalan con un círculo de tiza los puntos que han de ser rellenados con metal de soldadura, y los soldadores tapan estas picaduras con cuidado. A continuación de los soldadores viene una cuadrilla de trabajadores con amoladoras portátiles. Estos nivelan y alisan el metal excedente, examinando también la soldadura para ver si está trizada o tiene otros defectos. Si todo no está conforme, el trabajo se hace de nuevo.

El tubo es biselado, para emplearse en la línea, por el procedimiento de soldadura de la construc-

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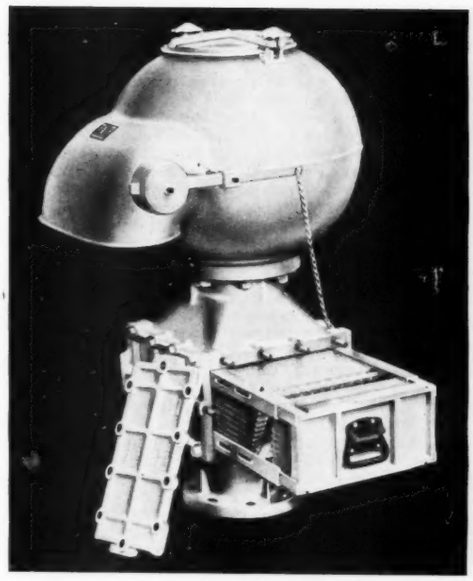

Figure 58 A
Conservation Vent Unit
Closed Type

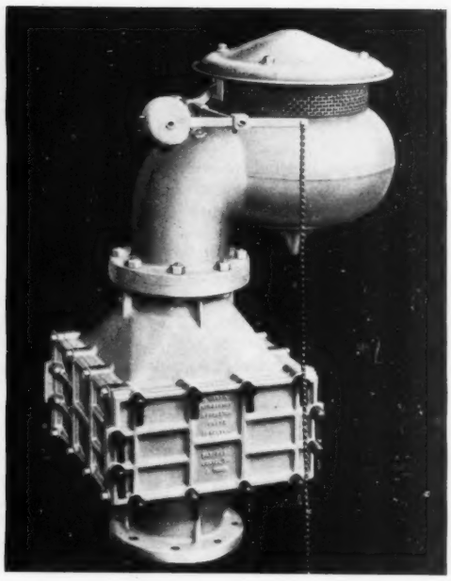

Figure 59 A
Pressure and Vacuum Relief Unit
Open Type

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Made entirely of aluminum, these Units are not subject to electrolysis as the equilibrium potentials of all parts are at balance. Furthermore, aluminum resists all attacks of the elements and is not affected by hydrogen sulphide or any sulphurous acid. "Varec" all-aluminum Venting Units are non-freezing, non-corrosive and not subject to embrittlement under fire stress.

Ces unités ont de 30 à 200% de plus de débit d'écoulement par taille que tout autre unité évent-réservoir connue à ce jour.

Le dispositif anti-retour de flamme "Varec" est LE SEUL au monde qui soit signalé par les Laboratoires des Assureurs en relation avec la soupape-évent quand l'installation en est faite sous cette derniére. Les épreuves qu'on leur applique sont bien plus rigides que le simple essai dit de "tuyau à orifice ouvert."

Entièrement en aluminium, ces unités ne sont pas susceptibles d'électrolyse car les potentiels d'équilibre de toutes les pièces sont en équilibre stable. En outre, l'aluminum résiste à toutes les attaques des éléments et n'est pas affecté par l'hydrogène sulfureux ou tout acide sulfureux. Les unités à évents "Varec" tout aluminium sont incongelables, non-corrosives et non aptes à devenir cassantes au contact du feu.

Estos grupos tienen de 30 a 200% más capacidad de corriente, por tamaño, que todos los demás respiraderos de tanque del mercado.

El detenedor de llama "Varec" es el UNICO detenedor de llama del mundo anotado por los laboratorios de compañías de seguro en combinación con la válvula de respiración, para instalación debajo de esta válvula. Se someten a ensayos muchos más rígidos que los de la sencilla prueba de tubo de respiración abierto.

Estas válvulas se hacen enteramente de aluminio y por esta razón no están sujetas a electrolísis, en vista de que los potenciales de equilibrio de todas las piezas están en correcto contrapeso. Por otra parte, el aluminio resiste todos los ataques de los elementos y no es afectado por el sulfito de hidrógeno o por ácido sulfuroso. Las válvulas de respiración "Varec" enteramente de aluminio son incongelables, no pueden corroerse y no están sujetas a dañarse bajo la intensidad del calor.

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ing wheels. The latter level off the excess metal and then examine the weld for cracks and checks. If everything is not right the weld is made over again.

The pipe has been beveled for use in the line by the welding process of construction and after the filling of pits has been completed the pipe is coated and then returned to the right of way for relaying or is stacked in the yard to be used at some other place later. This pipe is capable of withstanding full pipe-line pressure usually used in any line of this kind and when it is properly welded into the line makes a system good for many years of service. The pipe usually is coated and wrapped before it is put in the ditch. This is not always the case, but in every instance care is used in backfilling the ditch so that large rocks do not fall against the exposed pipe. If rocks do strike wrapped pipe the coating will be damaged and broken and if rocks strike bare pipe the scar may be the point at which active corrosion will start later.

Pipe reconditioning is now an accepted part of the pipe line business, and by whatever method this work is carried on many millions of dollars are being spent each year to keep the pipe line systems in first-class operating condition. If capable of carrying full pipe line capacities the earning on the investment is higher and as all pipe lines have only a limited productive life it is quite essential that the investment be returned as quickly as possible. Improved pipe line technique is doing this and at the same time keeping the lines in condition to handle the ever increasing daily demand for crude oil from the various oil fields of this country.

WELDING TECHNIQUE

Welding of pipe in making pipe lines and in repairing them has become such an accepted practice that it would seem there is little news to be given. However, the welding companies are striving for improvement all the while and new methods are being devised. With the stovepiping method one centralized crew lines up the pipe and welds the joints as construction progresses. The crew consists of the regular welding gang, with one or two additional welding machines and operators. The usual procedure is to line up the pipe on skids high enough above the ground to permit making the weld entirely around the joints. Each weld is made individually with the pipe stationary. The joint is tack-welded as the pipe is lined up, and following this tack welding the joint is finish welded.

Another variation of this type of pipe line construction is known as all-bell-hole welding. The two methods differ in details only. Pipe lengths are lined up one after another, usually over the ditch, and then are welded into a continuous line, each weld being made without turning the pipe. In the simplest form, the stab-on method, two operators commence welding the joint just as soon as it is lined up, eliminating the usual tack-welding. Bending, line-up and welding operations are all taken care of by a crew working comparatively close together.

TRANSPORTATION

An innovation in pipe line construction was introduced by Shell Oil Co. on its new San Joaquin Valley, Calif., line. Much heavy, viscous oil is handled by this addition, so heating is necessary for efficient operation. It was realized, however, that there would be considerable cooling of the oil between pump stations, and this would cause unusual resistance to flow over about the last third

(Continued on Page 301)

canalisation par le procédé de soudage de construction, et après qu'on a comblé les piqûres on enduit le tuyau et on le renvoie à la concession pour en refaire la pose, ou encore on l'empile au chantier en vue d'un autre emploi à quelque autre endroit par la suite. Ce tuyau est apte à supporter la pleine pression de pipe-line employée en général dans une conduite de ce genre, et quand il est bien soudé dans la canalisation il donne un réseau pouvant durer de nombreuses années en service. D'ordinaire on enduit et on enveloppe le tuyau avant de le poser dans la tranchée. Ce n'est pas toujours le cas, mais on ne manque jamais de prendre soin de combler la tranchée de terre afin que le tuyau ne soit pas exposé à recevoir de gros rocs. An effet, si des rocs viennent à frapper un tuyan enveloppé, l'enduit en sera abîmé et brisé, et si des rocs viennent à frapper le tuyau mis à nu, la blessure risque d'être le point de départ d'une corrosion active par la suite.

La réfection des tuyaux est maintenant reconnue comme une opération courante de l'entreprise de pipe-lines, et quelle que soit la méthode adoptée pour effectuer ce travail il est dépensé de nombreux millions de dollars chaque année pour maintenir les réseaux de pipe-lines en parfait état pour le service. Si ces réseaux maintiennent leurs pleines capacités de transport le rapport des capitaux engagés est meilleur, et comme tous les pipe-lines n'ont qu'une vie productrice limitée il est tout à fait essentiel que l'on rentre dans son argent le plus rapidement possible. Une technique perfectionnée de pipe-lines permet de réaliser cette fin et maintient en même temps les conduites en état de faire face à la demande journalière sans cesse croissante en pétrole brut des divers champs de pétrole des Etats-Unis.

TECHNIQUE DE SOUDURE

La soudure des tuyaux lors de la confection des pipe-lines et de leur réparation est devenue une pratique si courante qu'il semblerait qu'on ne puisse pas dire grand'chose de nouveau à leur sujet. Toutefois, les compagnies de soudure ne cessent de s'efforcer d'apporter des perfectionnements et imaginent des nouvelles méthodes. Selon la méthode dite de "tuyautage de poële," une équipe centralisée aligne le tuyau et soude les joints à mesure que la pose se poursuit. L'équipe consiste du personnel de soudage habituel, avec une ou deux machines à souder en plus avec opérateurs. La méthode courante consiste à aligner le tuyau sur des patins assez élevés au-dessus du sol pour permettre de faire la soudure entièrement autour du joint. Chaque soudure est faite individuellement avec le tuyau fixe. Le joint est soudé au point lors de l'alignement du tuyau, et à la suite de ce soudage au point le joint est soudé par soudage de finition.

Une autre variante de ce type de construction des pipe-lines est connue sous le nom de soudure tout trous évasés. Les deux méthodes ne diffèrent que dans le détail. On aligne les longueurs de tuyau les unes après les autres, en général au-dessus du fossé, et on les soude alors en une conduite continue, chaque soudure étant faite sans tourner le tuyau. Dans sa forme la plus simple, la méthode dite porte-coupe, deux ouvriers commencent la soudure du joint dès l'alignement terminé, ce qui supprime la soudure au point habituelle. Les operations de cintrage, d'alignement et de soudage sont toutes exécutées par un personnel qui travaille en collaboration relativement étroite.

TRANSPORT

Une innovation en construction de pipe-lines a été introduite par la Shell Oil Co. sur sa nouvelle canalisation de San Joaquin Valley, Calif. Ce pipe-line additionnel transporte beaucoup de pétrole lourd et visqueux, de sorte qu'il faut chauffer pour assurer un fonctionnement efficace. Mais on s'est rendu compte qu'il se produirait un refroidissement marqué du pétrole entre les stations de pompage, et qu'il en résulterait une résistance marquée au courant sur environ le derniers tiers de chaque section. C'est pour cette raison qu'on a eu recours à du tuyau de fort diamètre pour la portion descendante de chaque section. On a employé du tuyau de dix pouces pesant 34,83 lbs. sur le côté décharge de chaque station sur une distance de 4 milles. Après cela on a utilisé du tuyau de 10 pouces et 31,2 lbs. sur une distance égale. Cette réduction de poids était possible grâce à la diminution de pression de conduite à cette

(Continué sur Page 301)

ción, y terminada la tapadura de las picaduras, es revestido y devuelto al campo, para ser aquí instalado de nuevo, o bien, es enviado al patio de almacenaje, para emplearse más tarde en otros lagares. Este tubo queda preparado para resistir la presión completa de la tubería conductora, que ordinariamente se utiliza en los sistemas de esta clase. Al soldarse correctamente en la línea, resulta bueno para muchos años de servicio.

Antes de su instalación en la zanja, el tubo recibe generalmente adecuado revestimiento protectivo y forro de papel. Sin embargo, esto no se hace siempre, pero, en todo caso, se toma la precaución de que al tapar de nuevo la zanja, no se dejen caer rocas grandes sobre el tubo desnudo. Cuando las rocas caen con fuerza sobre un tubo protegido, el revestimiento se daña y separa, y cuando caen cobre un tubo desnudo, la rayadura causada por el golpe puede ser más tarde el punto de partida de una activa corrosión.

La rehabilitación o rehabilitación de tubos viejos es ahora aceptado como una actividad integrante del negocio de tuberías, y sin consideración del método que se siga para hacer este trabajo, se gastan anualmente millones de dólares en conservar los sistemas de tuberías conductoras u oleoductos en perfecto estado de funcionamiento. Cuando estos sistemas se mantienen a su completa capacidad transportativa, el capital invertida en la explotación product mejores dividendos. Como todos estos sistemas tienen una limitada duración productiva, es, por lo tanto, de suma importancia que el capital invertida se recobre lo más pronto posible. Una técnica más perfecta, en lo tocante a sistemas de tuberías u oleoductos, está realizando este fín, y al mismo tiempo, manteniendo las líneas en condiciones adecuadas para el manejo de la creciente demanda diaria de petróleo crudo, que se exige los numerosos campos petrolíferos de los Estados Unidos de América.

TECNICA DE SOLDADURA

La soldadura de tubos, en conexión con la instalación de tuberías conductoras u oleoductos, o en conexión con su reparación, es una práctica tan corriente, que parece, a primera vista, que ninguna cosa de nuevo pudiera decirse sobre el particular. Sin embargo, las compañías dedicadas a soldadura se están afanando contínuamente por descubrir adicionales refinamientos y han ideado nuevos métodos en este sentido. Con el método llamado "tubería de estufa" (stovepiping) un personal central alínea la tubería a solda las uniones, a medida que progresa la instalación. El equipo consta de una cuadrilla ordinaria de soldadores, con una o dos adicionales máquinas de soldar con sus operarios. El procedimiento corriente es alinear la tubería sobre patines bastante elevados sobre el suelo para permitir hacer la soldadura completa alrededor de las uniones. Cada soldadura se hace individualmente, mientras la tubería está fija. La unión se solda provisionalmente durante la alineación de la tubería, y a continuación de esta soldadura provisional, viene la soldadura final.

Otra variación de este tipo de instalación de tuberías conductoras, es el conocido bajo el nombre de soldadura de agujero abocinado. Los dos métados no se diferencian sino en etalles. Los tubos se alínean, el uno detrás del otro, generalmente encima de la zanja, y son en seguida soldados en una línea contínua, haciéndose cada soldadura sin girar el tubo. En su forma más sencilla, el método llamado "stab-on," dos operarios empiezan a soldar la unión, tan pronto como queda alineada, suprimiéndose la soldadura provisional. La soldadura, la alineación y la dobladura, son todas ejecutadas por un personla que trabaja en colaboración relativamente estrecha.

TRANSPORTE

Una innovación en la construcción de tubería transportadora fué introducida por la Shell Oil Co., en su nuevo sistema en el Valle de San Joaquin, California. Mediante esta adición se puede manejar un petróleo más pesado y viscoso y para el mejor manejo del trabajo es necesario recurrir al calentamiento. Se comprendió, sin embargo, que iba a presentarse un considerable enfriamiento del aceite entre las estaciones de bombas, y que ésto iba a causar una gran resistencia a la corriente en más o menos una tercera parte de cada sección. En vista de ésto, se empleó una tubería de mayor diámetro en la parte descendiente de cada sección. Se empleó una tubería de diez pulgadas de 34,83 libras por pié lineal, en el punto de descarga de cada es-

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of each section. For this reason larger-diameter pipe was used on the downstream portion of each section. Ten-inch pipe weighing 34.83 pounds per foot was used at the discharge side of each station for a distance of 4 miles. After this, 10-inch 31.2 pound pipe was used for an equal distance. The weight reduction was possible because of the decreased line pressure at this distance. The weight reduction was possible because of the decreased line pressure at this distance from the booster stations. Following these light 10-inch sections, 12-inch 37.45 pound pipe was used for distances of about 4 miles to the intakes of the booster stations.

Heating of the oil on this line represents new practice in that the heaters are also used as steam condensers. Exhaust steam from the pumps is used to heat the oil in shell-and-tube heaters. In these the steam is condensed, and the water and vapors are removed by means of vacuum pumps and steam jets. The condensing process places a vacuum on the pump exhausts, thus increasing the effective pressure of the steam-generating plant.

On the Shell line automatic operation has been developed to a point where it is possible to change the transmission rate at the initial station and have all the following stations automatically adjust themselves to this rate. This is done by pressure-regulators which maintain a constant pressure of 25 pounds on the intake of each station. Pump speeds are automatically controlled to maintain this intake pressure.

(Continué de Page 300)

distance des stations de renfort. A la suite de ces sections légères de 10 pouces, on a employé du tuyau de 12 pouces et 37,45 lbs. sur des distances d'environ 4 milles jusqu'aux tuyaux d'entrée des stations de renfort.

Le chauffage du pétrole sur cette conduite constitue une nouvelle pratique en ce que les réchauffeurs servent aussi de condenseurs de vapeur. La vapeur d'échappement des pompes est employée pour chauffer le pétrole dans des réchauffeurs type enveloppe-et-tubes. C'est là que la vapeur est condensée et que l'eau et les vapeurs sont entraînées au moyen de pompes à vide et de jets de vapeur Le procédé de condensation prévoit un vide sur les tuyaux d'échappement de pompe, ce qui augmente la pression effective du groupe générateur de vapeur.

Sur la conduite Shell, la marche automatique a été poussée à un point tel qu'il est possible de changer la vitesse de transmission à la station initiale et d'obtenir un réglage automatique de toutes les stations suivantes à cette nouvelle vitesse. Ceci est réalisé par des régulateurs de pression qui maintiennent une pression constante de 25 lbs. à l'entrée de chaque station. Les vitesses des pompes sont réglées automatiquement afin de maintenir la pression d'entrée.

(Continué de Página 300)

tación hasta una distancia de 4 millas. A continuación de ésto, y por una distancia igual, se empleó una tubería de diez pulgadas de 31,2 libras por pié. La reducción de peso se hizo posible a causa de la menor presión en la tubería a esta distancia de las estaciones de las bombas. A continuación de estas secciones livianas de 10 pulgadas, se empleó una tubería de 12 pulgadas de 37,45 libras por distancias de como 4 millas a los puntos de admisión de las estaciones de las bombas.

El calentamiento del petróleo en esta tubería de transporte representa una práctica completamente nueva en el sentido de que los calentadores se emplean también como condensadores de vapor. El vapor de escape de las bombas se aprovecha para calentar el petróleo en calentadores tubulares. En éstos, el vapor se condensa el agua y los vapores son extraídos mediante bombas de vacío y chorros de vapor. El procedimiento de condensación impone un vacío sobre los escapes de las bombas, aumentando así la presión efectiva de la instalación generadora de vapor.

En la nueva tubería de la Shell, la operación automática ha sido desarrollada hasta el punto de que es posible cambiar la rapidez de la transmisión, en la estación inicial, y todas las estaciones siguientes se ajustan automáticamente al nuevo régimen. Esto se hace por medio de reguladores de presión, los cuales mantienen una constante presión de 25 libras en la admisión de cada estación. Las velocidades de las bombas se gobiernan automáticamente, para que mantengan esta presión de admisión.

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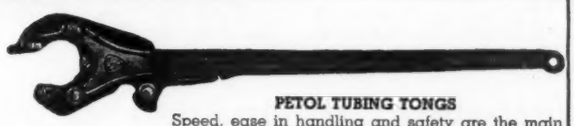

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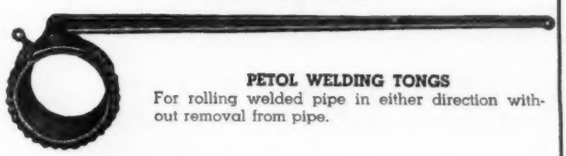

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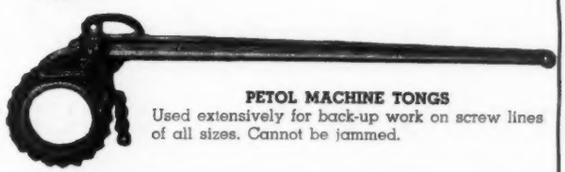

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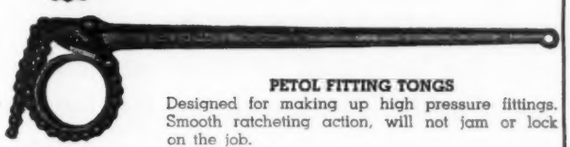

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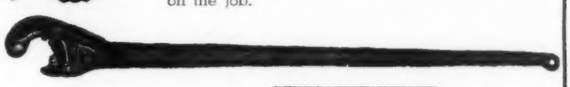

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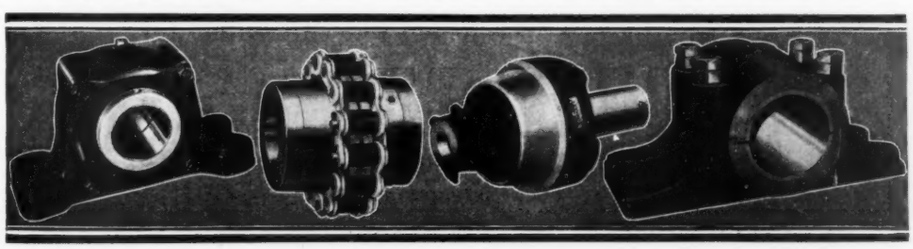

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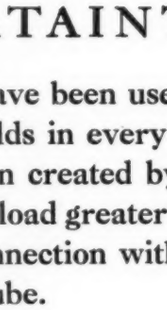

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Seismograph Work Abroad

(Continued from Page 75)

tool rigs. As these must be light in order to be transported where there are no roads, they are bound to operate very slowly and it is for that reason that a large number of them are needed to keep ahead of the seismograph crew.

Special Mountings

In foreign regions where roads exist at intervals of not more than 2 miles or where temporary roads can be cheaply cleared and graded, and also in open country where motor vehicles can be driven anywhere without the construction of roads, regular seismograph drills such as are used in the United States may be employed. In difficult terrain they may be mounted on crawler or semicrawler type chassis similar to those used for war tanks, or a tractor may be supplied as an auxiliary to tow the trucks through difficult passages. Where operations are carried on along the shores of navigable streams or on bays, lakes or other open water, the transportation problem is greatly simplified. All the seismograph equipment and the heaviest shot hole rigs can be readily transported on boats or barges and can be operated on the same. Occasionally a houseboat may even be used in lieu of a camp, if satisfactory living quarters on land are not available.

The supplying of water for drilling operations is an even more difficult problem than the transportation of the drilling rigs, if these operations are being carried on in any region where the water cannot be carried on a truck. It is in these areas that the hand portable drilling equipment or the light, demountable rigs are the most useful. They will operate on very little water, so that sufficient water can be carried in casks or cans by a string of pack animals.

Maintaining camps for the technical staff and laborers, with facilities for the care of the equipment, pack animals, etc., is a serious problem, and yet is rather generally overrated. When it is realized that a large party of 15 to 40 men is to be cared for, there is a natural tendency to make too elaborate preparations for their care. For efficient operation the camp must be moved frequently, and therefore the equipment must be readily portable. It should be realized that if two geologists can get along with one small tent, a couple of cots, some blankets, cooking utensils and food supplies, that 15 men should be able to get along with very little more than a proportionate increase in equipment. Of course, if a semipermanent camp is to be established for a period of six or eight months, a well-supplied kitchen with cookstoves, dining quarters, refrigerators, floored tents or houses, etc., are much to be desired, but if efficiency demands that the camp be moved every three or four weeks, such luxuries can be dispensed with. Simplification of equipment does not mean that the crew need suffer from cold, hunger, mosquitoes, or dampness. An experienced expedition outfitter can equip a party so that simplicity will not seriously interfere with comfort. It is therefore highly recommended that a person having experience with rapidly moving expeditions be allowed to select the camp equipment for a seismograph party working in undeveloped regions.

Of course ruggedness, lightness, compactness, and durability are even more to be desired abroad than at home. Plenty of spare parts are an obvious need, although modern reflection seismographs seldom require repairs. Many instruments can be kept in continuous operation for 8 to 10 months without any repairs or overhauling.

In closing a word may be said about the personnel of a seismograph party in foreign service. The technical staff must be of a type that can stand on their own two feet in any emergency. They must understand the physical characteristics of their instruments and must be sufficiently versed in geology to comprehend geological conditions which are new to them. They must have con-

siderable intestinal fortitude and adaptability. The homebody, motion-picture devotee, and the chair warmer will not find foreign exploration to his liking. Another not uncommon type who finds himself out of place in foreign work is the man who resents hearing people speak in foreign languages, and attributes a native's inability to understand his garbled attempts at foreign speech to the native's stupidity. A geophysicist who goes abroad must feel equally at home sleeping on the deck of a river boat with peasants and livestock or attending a state dinner in some obscure department of a foreign republic or colony. And withal he must be a scientist. A seismograph party composed of the wrong men cannot operate efficiently in foreign countries. Indeed the selection of the proper personnel is the most difficult problem in foreign seismograph operations.

Oil Fields of the U.S.S.R.

(Continued from Page 73)

ceous and Tertiary strata are at or near the surface over most of the district. In the northern part of the basin, Mesozoic strata are folded into flat arches trending east and west. In the Emba River Valley a series of dome-like folds extends generally north-south. Some of these domes are highly faulted and overthrust. In drilling, massive bodies of rock salt and gypsum have been encountered, but the structure and extent of these bodies have not been fully established. Folding in general becomes sharper and the beds are more disturbed to the southwest near the delta of the Ural River. To the southeast towards the Ust-Urt Plateau the folds lessen in amplitude.

The developed oil fields of the Emba district lie in northern and southern "zones." In the southern zone, in the lower reaches of the Emba Valley, are the fields of Dossar, Makat, Baichunas, Yushchi, Iskane, and Koschagyl. In the northern zone, north of the upper Emba Valley are the Shubarkuduk and Djaksymai fields. Drilling first began near Dossar, about 50 miles east of the Ural mouth and 25 miles from the Caspian Coast, in 1909, and a small production was obtained from shallow wells. Subsequently other small fields were developed in the general vicinity. Production increased until 1917, but during the period of readjustment following the Revolution, the area went into decline. Since 1921, production has increased to beyond the prewar level, but it is still not large.

The Dossar and Makat localities are the most important from the standpoint of present output. Here, oil is obtained at depths averaging about 750 feet, presumably from the Lower Cretaceous or Upper Jurassic sands. In view of the faulted condition of the Mesozoic strata, the oil may have originated in the unconformity underlying the Permian beds which yield oil in the Ural region farther to the north. Early drilling was done on the basis of seepages which are numerous. The district abounds in "structures" over 200 of which are said to have definite signs of oil.

The oil at Dossar and Makat contains very little tar or paraffin. The Dossar oil is a greenish colour and ranges from 27° to 43° A. P. I. gravity. The Makat oil ranges in gravity from 25° to 29° A. P. I. The average is about 33° A. P. I., and yields about 20 per cent gasoline. At Koschagyl, oil of a mixed base yields 40 per cent bright stocks, and the gasoline obtained from it is of high octane number. Near Dossar a heavy dark brown oil of 19° A. P. I. gravity yielding good lube stock has been obtained from shallow wells.

Lower Volga and Kalmyk-Salsk Steppes

This vast district includes all of the region outside the Emba district. It lies mainly west of the Ural River and extends around the northern Caspian Sea to the Caucasus. It is a flat alluvial country marked on its western periphery at the surface by Neogene and some Paleogene beds. To date, there are no productive oil fields in the district, and very little exploratory work has been done, notwithstanding that the area is geologically favorable to large deposits of petroleum. Recently, investigations have been carried out on the western borders of the district near Stalingrad and Saratov. Gas has been discovered at Astrakhanshoe near the Volga mouth and at Melnikovoskoe between Saratov and Uralsk in the northeast. A number of salt domes are suspected west of the Volga delta.

TABLE 6—PRODUCTION AND RESERVES OF CRUDE PETROLEUM IN THE URAL REGION OF THE U.S.S.R., BY DISTRICTS, JANUARY 1, 1937

District	Daily Average Output of Crude Oil		Reserves					
			Proved		Possible		Total	
	Barrels	Per Cent	Thous. Bbls.	Per Cent	Thous. Bbls.	Per Cent	Thous. Bbls.	Per Cent
Bashkira	(*)18,565	99.1	134,400	42.4	2,422,000	30.5	2,556,400	35.4
Permian Prikamye	565	.9	53,900	17.0	2,424,100	30.6	2,478,000	34.3
Samarskaya Luka	(*)	....	53,900	17.0	1,258,600	18.3	1,312,500	18.2
Orenburg-Aklyubinski	0	....	0	....	714,700	10.4	714,700	9.9
Ukhtinski	(*)	....	74,900	23.6	79,800	1.2	154,700	2.2
Total Ural region	18,739	100.0	317,100	100.0	6,899,200	100.0	7,216,300	100.0
Per cent	....	4.4	....	....	95.6	....	100.0	....

(*) Samarskaya Luka and Ukhtinski included with Bashkira.

THE URAL REGION

The Ural region embraces the entire western front of the Ural Mountains along the eastern side of European U. S. S. R. In general, it takes in all that country north of the Emba-Volga region between the Volga River and the Ural Mountains. It is about 500 miles across at the southern end and wedges gradually northward to less than 50 miles in width, at a point about a hundred miles south of the White Sea. It has an area of approximately 273,-

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000 square miles, or more than that of the state of Texas.

Geologically, it is a great Permian Basin which is underlain by Paleozoic and Archeozoic rocks. The oil is found in rocks ranging in age from the Permian to Devonian, but mainly in limestones of Lower Permian age. The oil measures thin generally from the Urals westward and northward. Accumulations have taken place mostly in buried structures incidental to regional uplifts. These structures may be either old eroded land surfaces or depositional reefs.

At present, there are only three commercially productive areas in the region, but others are known, and at the beginning of the year 15 of these were being prospected by deep drilling. Altogether the several fields of the region produced, during 1936, an average of 18,739 barrels of crude oil daily, or 3.3 per cent of the national average output. First commercial production began in 1929 and, up to January 1, 1937, a total of 13,573,000 bbls., or about 0.3 per cent of the national total had been produced. Notwithstanding the small output thus far, the region holds 5.1 per cent of the proved reserves of the nation, and 17.0 per cent of its possible reserves. Only 0.2 per cent of the ultimate production of the region has been produced, and reserves remain which total 7,216,000,000 bbls., or about 18 per cent of the total of the country.

The region may be divided into five districts. They are in order of largest possible reserves: the Permian Prikamye, centering around the town of Perm in the central west Urals; the Bashkira, to the south, in Bashkirian A. S. S. R. around the towns of Ufa and Sterlitamak; the Samarskaya Luka, still farther south and west, near Kuibyshev (formerly Samara); the Orenburg-Aklyubinski, south of Baskir and near Orenburg; and the Ukhtinski, in the north along the western headwaters of the Pechora River. By far the most important of these districts is the Bashkira which accounts for more than 99 per cent of the present output, holds 42 per cent of the proved reserves, and more than 30 per cent of the possible reserves. The Permian Prikamye, however, leads slightly in possible reserves.

Permian Prikamye (Kama) District

The Permian Prikamye or Kama district lies in the central western part of the Ural region through which the Kama River flows. The district is a densely populated one with the town of Perm as its chief centre although Sverdlovsk to the southeast is a larger city. Oil was discovered in this district in 1929 in the Verkhne-Chussovskye-Gorodki, about 40 miles northeast of the town of Perm on the Chussovovaya River but, concerted development did not take place until the discovery of oil in the Krasnokamsk area, 24 miles west of Perm, in 1934. Although these discoveries are important, production of crude oil has not been large, and during 1936 averaged only about 175 barrels daily for the area. Nevertheless, proved reserves are estimated at 53,900,000 bbls., and possible reserves at 2,424,800,000 bbls., or 30 6 per cent of the total for the Ural region.

Verkne-Chussovskye-Gorodki.—This area to the northeast of Perm produces oil from the upper part of the Uralian (Lower Permian) at depths ranging from 730 to 1,175 feet. Up to January 1, 1936 approximately 434,000 barrels of oil had been taken from the field. The structure is a small buried hill with a diameter at the bottom of about 1,880 feet and an elevation of 600 feet. This calcareous hill is overlain and enclosed by deposits of Kungurian (Upper Permian) age. The structure is reflected only slightly at the surface. The reservoir rocks of the productive Uralian strata are chiefly dolomitic limestones. Slight occurrences of oil have been observed in the underlying coral limestones. The buried type of structure is common in the area, and during the past two years at least 15 have been located by geophysical methods.

Krasnokamsk.—In this area west of Perm, oil was discovered in June 1934 while drilling a deep well for water. Showings of oil were obtained between depths of 480 and 540 feet, and from 2,700 to 2,850 feet; production of about 120 barrels a day was established. The oil occurs in the Lower Kungurian (Upper Permian) dolomites at the 480-540-foot depth and in calcareous-argillaceous beds of the lower Moscovian (Upper Carboniferous) age at the 2,700-2,850-foot depth. The Lower Carboniferous and Devonian are expected to be productive but to date only one well has been drilled below the Moscovian. The reservoir rocks of the Permian are dolomites, chiefly oolitic, with effective porosity varying from 5 to 29 per cent. In the Carboniferous, the productive rocks are clastic limestones with an average porosity of from 5 to 6 per cent, but with extremes from 1 to 26 per cent. The thickness of the productive horizons ranges from 30 to 120 feet. The gravity of the upper oil averages about 21° A. P. I., and that of the lower oil 35°. The upper oil contains about 2.5 per cent sulfur and the lower oil about 1 per cent. The gasoline and kerosene content averages about 22 per cent for the upper oil and 36 per cent for the lower.

The results of drilling and of magnetometric surveys show the Krasnokamsk field to be on an uplift some 45 miles long with the Krasnkamsk portion about 7.5 miles long. There is little doubt but what numerous other localities exist on this uplift where commercial accumulations of oil might be developed but the output is expected to remain small under the usual methods of development, principally because the porosity of most of the reservoir rocks is low. Treatment of the oil-bearing dolomites with hydrochloric acid is practised, but with little success.

(Balance of the article, including description and map of the Caucasus region will appear later.)

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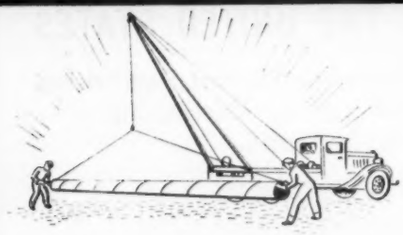

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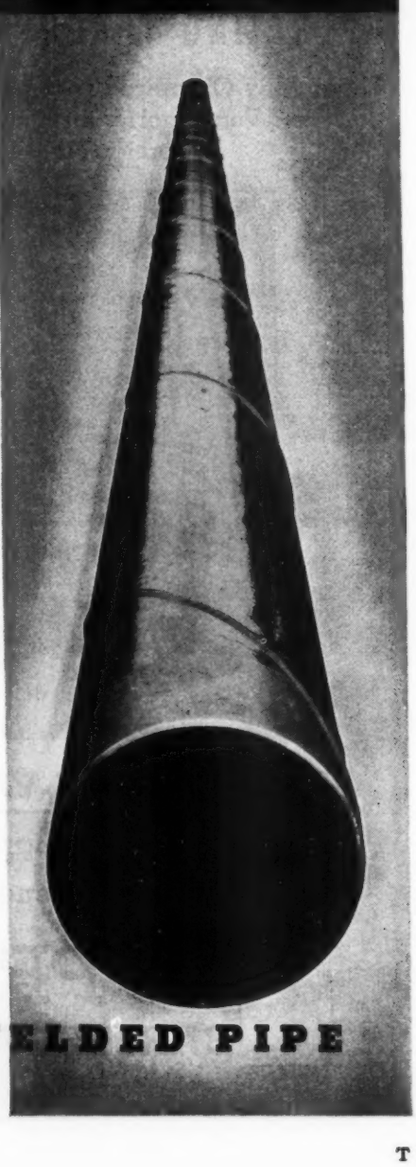

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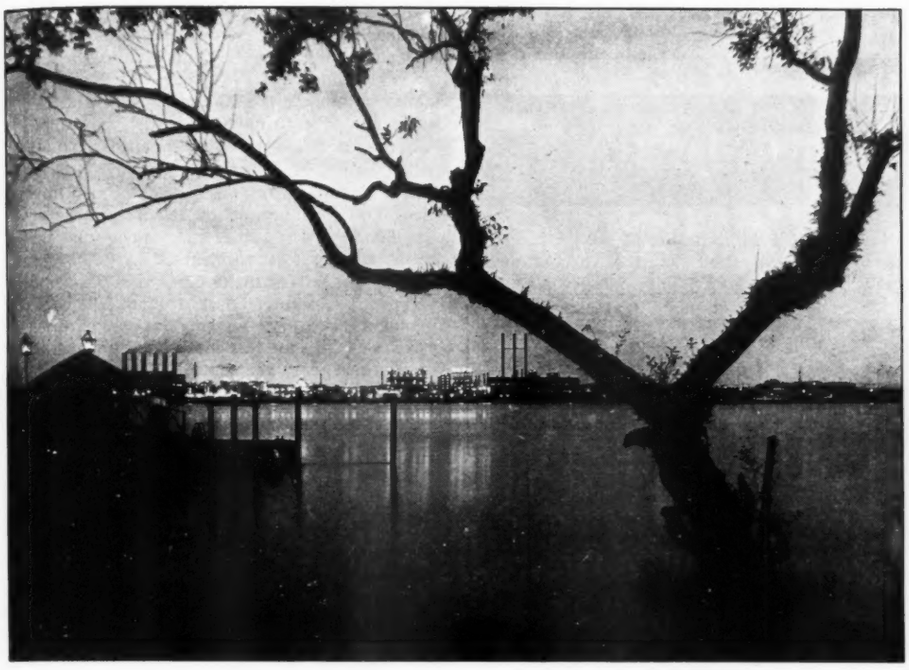

Palembang refinery on the Moesi River, Sumatra

By W. Holst, Jr. and A. B. Vought

Palembang refinery is picturesquely located on the banks of the Moesi River, which flows from the highlands of Sumatra to the Banka Straits, a few degrees latitude below Singapore and almost on the equator. Ocean-going tankers sail 60 miles up the river before reaching the refinery location which bears the name Soengei Gerong. This site is 6 miles downstream from Palembang, one of the largest and oldest cities of Sumatra, which has a population of 110,000, including 2,500 Europeans.

Eighty miles away lie the Talang Akar producing fields, from which the crude oil refined at Palembang derives its name. The oil is sent to the refinery through pipe lines, which cut a path through the well-nigh impenetrable jungle.

Palembang refinery is owned and operated by Nederlandsche Koloniale Petroleum Maatschappij (Netherland Colonial Petroleum Co.), which is in turn a subsidiary of Standard-Vacuum Oil Co. N.K.P.M. has just celebrated its twenty-fifth anniversary this year, but the refinery at Soengei Gerong was not built until 1926.

In 1929, during the first major refinery expansion, four single-circuit tube and tank cracking coil units were constructed. These served to crack the heavy distillate stocks obtained from the crude oil by vacuum distillation, the crude residuum being used as refinery fuel.

In 1936, with drilling and producing operations gradually expanding and additional market outlets available, it became essential to increase the refinery capacity and this was accomplished by two expedients:

1. Reconstruction of two cracking coils to permit two-stage cracking on each.
2. Development of reduced crude cracking.

The reconstruction of the cracking coils involved the erection of a new furnace and a new tar flash drum for each unit. The capacity of the reaction chambers and overhead fractionation equipment was considered adequate for handling the additional throughputs.

All construction details were carried out by the local mechanical department and its engineering staff. The refinery has complete mechanical facilities, including machine shop, brass and iron foundry, boiler shop, welding department, carpenter shop, oxygen manufacturing plant, mason department and all attending services. The local mechanical forces are organized to handle all new construction work from pile foundations to finished operating units and include an efficient maintenance section for keeping all equipment in the refinery in first class condition. The skilled mechanics in most trades are Chinese with a due proportion of Japanese, Tamil Indians, and native Malay coolies. These workmen are supervised by Europeans and the quantity of work per man hour is of a high order. Storehouse facilities are arranged to provide material for all classes of work. They are controlled by an efficient stock record system which is currently revised to keep the total amount of warehouse material at a minimum commensurate with changing refinery requirements, changing delivery dates and shipping schedules.

After reconstruction of the two cracking units was completed, the local technical department conducted the necessary plant scale tests to determine the optimum method of operation, and so successful has been the development of reduced crude cracking in double-circuit units, that only recently the refinery operated at 180 per cent of its 1935 capacity, with no changes in its crude distillation or cracking equipment other than those already mentioned.

It may be of interest to include at this point a brief description of the present two-stage operation. After the naphtha and kerosene fractions are topped off at the crude distillation units, the reduced crude is sent to the reconstructed cracking coils. Here, the feed stock is first preheated by heat exchange with distillate products. The preheated oil flows to an accumulator, from which

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high pressure pumps take suction, and transfer the oil to the "fresh feed" furnace by way of the high pressure intercondensers, where heat exchange with tar separator vapors provides additional preheat. After being raised to cracking temperatures the stock from the "fresh feed" coil combines with the stream from the "cycle stock" furnace, and passes through the reaction chambers.

The cracked product from the reaction chambers is fractionated into tar, cycle stock and naphtha. The cycle stock is collected in a separate accumulator and is not combined with the stock flowing to the "fresh feed" circuit. Instead, it is pumped to the second furnace where it is possible to heat it to a much higher temperature than the reduced crude in the fresh feed coil, by virtue of the fact that it is entirely a clean distillate stock and therefore less subject to coking. In effect, the "fresh feed" circuit is a "once-through" operation on the charge stock to the unit, while the "cycle stock" circuit represents a recycle operation on the cracked gas oils obtained by fractionating the reaction chamber product.

A new feature incorporated in the operation is the flashing of high temperature tar at reduced pressures after leaving the tar separator. This further reduces the tar gravity and provides an overhead stock at the flash unit which can be returned to the "cycle stock" accumulator for recycle cracking.

RUMANIA

Rumania, still the largest crude oil producer in western Europe, dropped from the world's fourth largest source of petroleum to sixth place in 1937 with a decline of 18 per cent. Two main factors were responsible for Rumania's decline. One is the revision of mining laws restricting the successful company or individual exploring a wildcat mining licensed area of 125,000 acres to a maximum final award of 6,750 acres. Until revised at the middle of the year the maximum award obtainable under the changed mining laws was 7,500 acres. While there has been some resumption of exploratory activity since the mining law was revised, the incentive to risk large sums of money in wildcat exploration in Rumania is still considered insufficient. During the first 10 months of this year Bucsani production declined about 35 per cent from its 1936 level.

In addition to about 500,000,000 lei paid in royalties on crude oil production, the Rumanian petroleum industry was subjected to taxes and other various charges to the extent of 6,814,238,000 lei, or about 58 per cent of its gross receipts. For approximately two years up until the middle of 1937, Rumanian exporting oil companies operated under conventions with the National Bank by which they were entitled to 10 per cent of the proceeds from sales in foreign currency which could be used in payment of obligations abroad. In May the conventions were rescinded by the National Bank which instituted a policy of requiring that all shipping documents pass through its hands or authorized agents for collection upon presentation to the purchaser. Under the new arrangement which continued through the end of the year all proceeds from export oil sales converge into the hands of the National Bank and the shipping oil companies are later paid in Rumanian lei with liberal deductions made for handling the collections and transmittals. Since approximately 80 per cent of Rumania's oil is exported either in the form of crude or refined products, the barriers of free trade work a particular hardship on companies operating in that country.

Despite the lack of incentive, oil companies have increased their search for new production throughout 1937. Drilling has been increased by about 30 per cent and an increasing proportion of it has been in unproven areas.

Petrol Block Societe Anonima Romana is constructing a polymerization and isooctane plant at its Ploesti refinery and a similar unit of the Universal catalytic design is under construction by Creditul Miniere Societe at its Brazi-Prahova works. Recovery of butane and propane by polymerization is projected in a plant under consideration by "Redeventza" S.A. Pentru Exploatarea si Comertul Produselor Subsolului at Ploesti. Romano-Americana, Standard of New Jersey subsidiary, with one of the largest refineries in the country at Taleajen, near Ploesti, is installing a reforming unit to deal with 2,000 bbls. of naphtha per day.

ARGENTINA

Division of the Argentina gasoline market between Yacimentos Petroliferos Fiscales (Y.P.F.), the government company, and the leading private competitors during the middle of the year will rank as 1937's outstanding development in that country. The agreement dividing the Buenos Aires and interior markets by a system of quotas is reported functioning satisfactorily. The agreement extends until the end of 1940. There is little incentive for private companies in Argentina to seek additional producing areas, partly because of the national laws regulating drilling permits and partly because of the uncertainties surrounding positions of private companies when the three-year term expires.

With the incentive of preferential treatment and ultimate prospects of a complete marketing monopoly in the Argentine republic, the Y.P.F.

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continues to expand its producing operations and its refining facilities. This continued effort to expand production on the part of Y.P.F. has been chiefly responsible for an increase of nearly 1,000,000 bbls. in 1937 production.

The Comodoro Rivadavia field continues to be the main source of Argentina crude oil production accounting for more than 80 per cent of the nation's total output.

The Y.P.F. launched construction of a modern cracking and polymerization unit at its La Plata field which will materially increase the capacity of this plant to produce quality motor fuel. During the middle of the year, Y.P.F. completed its Godoy Croz refinery at the province of Mendoza to operate on crude produced in that area.

In dividing the Argentina market, Y.P.F. and smaller marketers with which it holds supply contracts is allocated 1,192,767 bbls. out of a total of 1,885,500 bbls. for the Buenos Aires district, the most profitable in Argentina. The Standard Oil Co. of Argentina, subsidiary of Standard of New Jersey, was allocated 451,577 bbls. of the Buenos Aires market and the Shell group 241,156 bbls.

TRINIDAD

With Trinidad's production climbing to an all-time record an extensive refinery expansion and modernization program has been launched by Trinidad Leaseholds, Ltd., the largest refiner on the island. The company already was equipped with the largest and most modern refinery in Trinidad. It also is the second largest producer operating on crown and private lands at Fyzabad, Barrackpore and Guayaguayare. Trinidad Leaseholds is a subsidiary of Central Mining Co. of South Africa.

The new construction program is for the prime purpose of increasing motor fuel production and quality. The cracking and reforming capacity is being extended, and a polymerization unit will produce isooctane for use in preparation of aviation fuel for the British air ministry. The new equipment includes units for making high-grade diesel fuel oil. Housing facilities for the staff and laborers will be improved.

Portions of the new refining equipment have been completed by Foster Wheeler, the contractor, and are in service. The polymerization and hydrogenation plants and part of the cracking and reforming installations are in the final stages of construction.

The major part of the construction program is developing around two large cracking installations of the Dubbs type. A heavy-oil cracking furnace capable of handling 10,640 bbls. per day; a light-oil cracking furnace of 7,100 bbls. per day capacity, and a naphtha reforming unit to handle 3,600 bbls. per day, with 22 fusion-welded pressure vessels for fractionating and stabilizing the products are the essential pieces of equipment. A low-temperature, low-pressure, two-stage atmospheric and vacuum cracked gasoline rerun unit to handle 6,000 bbls. of unfinished gasoline per day is included in the program.

The company also is installing a heavy-oil furnace and vacuum flashing unit of 2,640 bbls. per day capacity and a 8,150-bbl. per day reboiler furnace. The isooctane installation is for the Universal Oil Products catalytic polymerization process with a hydrogenation plant for processing the diisobutylene recovered from butane and butylene into aviation gasoline meeting specifications of the British air ministry. Charging stock for the polymerization unit will be drawn from the cracking plant under the immediate plan of operation.

Completion of the construction program will make Trinidad Leaseholds' plant at Point-A-Pierre one of the most modern refineries in the southern hemisphere although it will not rank in capacity with the installations at Aruba and Curacao. The refinery has a rated capacity of 25,000 bbls. per day and the Dubbs cracking installation previously in use in the Trinidad Leaseholds' refinery was rated at 10,000 bbls. per day.

In pushing production to 15,155,000 bbls., estimated for 1937, practically all operating companies in this British colonial possession participated proportionately in the acquisition of new acreage and in the accelerated drilling program. Considerable offshore drilling probably will develop eventually in Trinidad as a result of the government's decision to entertain applications for permits extending into territorial waters. There remains considerable interior territory to explore, however, and it is likely that the inland prospects will continue to draw most of drilling in the near future. The older producing areas are considered to have exceptionally bright possibilities for producing from deeper horizons. Depths of 6,000 to 7,000 feet are becoming commonplace in Trinidad and it is probable that levels comparable with the deeper Gulf Coast and California fields of the United States will be explored.

Practically all the petroleum produced in Trinidad has been obtained from strata of Tertiary age. The island is separated into two geological provinces by an east to west fault running from near Matura in the east to Port of Spain in the west. This fault divides the metamorphic area of the northern range from the Tertiary sediments to the south. The chief features of the Tertiary structure are a synclinal basin between the central and northern mountain ranges; an anticlinal uplift along the south side of the central range striking in an east-northeast by west-southwest direction from Point-A-Pierre to the Nariva Swamp; and an undulating basin area between San Fernando, Mayaro Point, Guayaguayare Bay and Icacos Point with an east-west strike containing several zones of anticlinal and synclinal folding. These

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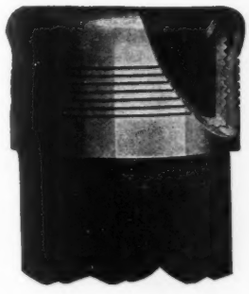

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numerous local folds are important in the concentration of petroleum and it is upon this latter area that the majority of the producing fields are situated.

The Fyzabad structure, also known as the Forest Reserve, produces nearly 60 per cent of Trinidad's crude production. Apex (Trinidad) Oilfields, Ltd., the largest producer on the island and Trinidad Leaseholds, Ltd., are the two main operators in the Forest Reserve district. Completion of a western extension producer in the Forest Reserve area during the early part of 1937 added considerable territory to the proven acreage and probably will provide more than adequate production to offset normal declines in older wells.

Efforts to develop production from the Cretaceous in the old Palo Seco field in the extreme southern part of Trinidad continue despite negative results attained in one test carried to 6,500 feet.

Much geophysical and geological work continues in the central third of Trinidad by Trinidad Northern Areas, Ltd., the company in which United British Oilfields of Trinidad and Trinidad Leaseholds, Ltd., are jointly interested.

There is very little acreage available for acquisition in the southern third of Trinidad where the 16 operating companies have extended their holdings during the past two years. More than 350,000 acres of land in Trinidad are held under lease for production and exploration.

There were more than 200 new completions scored in Trinidad during 1937, a large majority of which were drilled no deeper than 3,500 to 4,000 feet. However, more than 30 wells have been drilled to more than 6,000 feet and the tendency is toward continued exploration of greater depths.

Most of Trinidad's crude oil production is dependent on world markets for consumption. Only about 10 per cent of the country's production is consumed within the country, including refinery fuel and losses. The largest consumer is Great Britain, but exports are spread among about 20 other nations.

Asphalt production in Trinidad, an industry allied with the oil business less closely on the island than in this country due to conditions of supply, is ranging between 4,000 and 10,000 long tons per month. The famous asphalt lake at Brighton on the west coast is the chief source of supply.

GREAT BRITAIN

Great Britain's petroleum refining industry is undergoing extensive revision to incorporate late developments in processes and equipment for production of high-octane motor fuel and lubricating oils of the quality demanded by modern automobiles and aviation engines.

Although Great Britain is dependent on its colonies and foreign nations for its petroleum supply its nomination of the seas has saved it from refining problems common to European powers with less protection for their navies and merchant marine. Economic considerations, however, have dictated the construction and maintenance of an extensive refining industry, and competitive conditions require constant modernization.

Improvement and extension of the lubricating oil distillation and treatment facilities and replacement of the shell stills with continuous pipe-still type of operation are the chief objectives of construction work started by Anglo-Iranian Oil Co., Ltd., at Llandarcy. The full program probably will not be completed until the latter part of next summer.

Charging capacity of the revamped refinery will be approximately 8,100 bbls. per day, a range selected after analysis of the surrounding market demand which could be served economically by railroad and highway transportation facilities. Due to the restricted market for heavy fuel oil production, provision is made in design of the new equipment to produce a maximum quantity of high-grade lubricating oils and waxes running to bitumen.

A new plant for production of lubricating oils, gas oil and heavy fuel oils at the Manchester Oil Refinery, Ltd., works at Trafford Park, Manchester, is practically complete. The plant, designed by Moore & George, Ltd., of London, includes a vacuum distillation unit and Edeleanu solvent extraction and dewaxing installation.

Across St. Georges Channel and the Irish Sea from Great Britain, the Irish National Refineries, Ltd.'s project at Dublin for a complete refinery of 10,000 bbls. per day capacity was authorized in 1937 and preliminary work is moving at a satisfactory rate. The plant, designed by Foster Wheeler, Ltd., probably will not be completed before the latter part of 1938. Provision is made for a wide range of products and for operation on a variety of crude stocks. The plant will include facilities for atmospheric and vacuum distillation, cracking, reforming, solvent extraction and dewaxing of lubricating oil stocks, manufacture of asphalt and a system for gas recovery.

Shell Refineries, Ltd., installed a new solvent lubricating oil plant in 1937 at Shell Haven, using the Rectiflow process.

At Ellesmere Port, Anglo-American Oil Co. completed and placed in operation a specialty plant for production of naphthas and special solvents. The plant, engineered by Alco Products, consists of a fractionating tower equipped with reboiler and exchangers for production of naphthas. The solvent producing section of the plant is composed of three batch stills heated with closed steam coils or open

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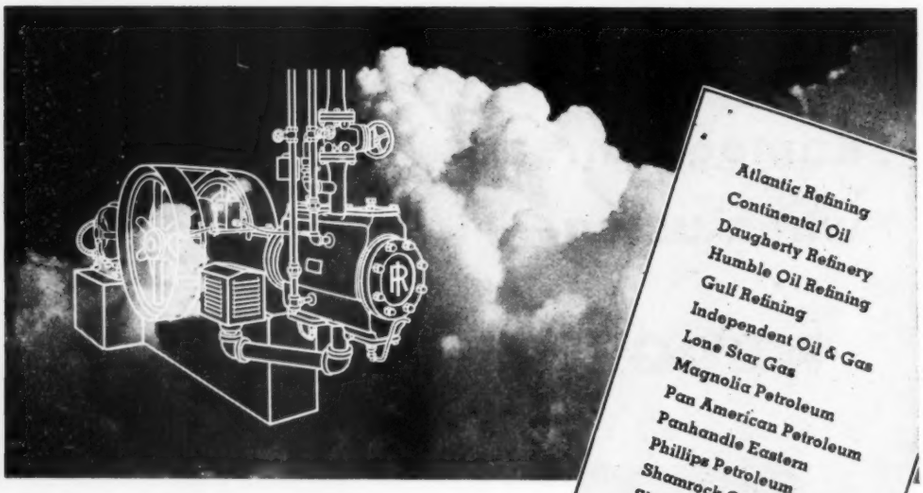

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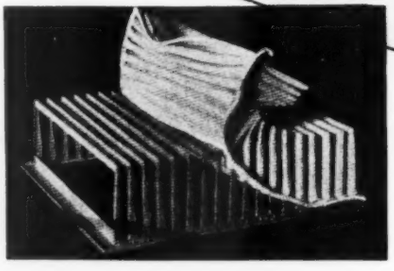

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7539

steam and fractionating towers. The solvent plant charge consists of treated benzine.

Lobitos Oilfields, Ltd., is nearing completion on extensions and alterations of its lubricating oil producing facilities at the Ellesmere Port refinery.

The Anglo-Iranian program takes rank as the largest project launched during the year in Great Britain. The modern continuous pipe still distillation units will replace a total of eight shell still benches. The new unit, which is now under construction, consists of three fractionating towers in series. The first works under pressure, the second at atmospheric pressure and the third under vacuum. Heat for the pressure tower is supplied by exchange from distillates and residues produced in the second and third towers, each of which has its own pipe still heater.

From the distillation unit will be obtained the required ranges of gasoline, naphthas, kerosene and gas oil, which thereafter will be subjected to acid or SO_2 treatment with reforming in certain cases to form the finished products. From the vacuum tower, heavy gas oil and the various grades of lubricating oil stock obtainable from the crude upon which the plant is operating at any particular time.

The second stage in the reconstruction program involves the provision of a modern solvent dewaxing and extraction plant. It was necessary to provide an extension of the existing dewaxing capacity. For this purpose, the Edeleanu SO_2-benzol process was adopted operating by the continuous removal through rotary filters of wax precipitated by the auto-chilling of the solvent due to evaporation induced by change of pressure. By varying the proportions of SO_2 and benzol the same general process can be adapted to the solvent extraction requirements of the Llandarcy refinery.

The combined solvent extraction and dewaxing plant will be situated in one building which will also contain compressors, vacuum pumps, mixing and separating vessels, chilling coils, rotary filters and various solvent evaporators necessary for the removal of the solvent after separation is completed. Under the arrangement adopted by the Anglo-Iranian it will be possible to dewax the lube stock before or after it is subjected to the extraction process.

An acid treating plant and a high temperature clay contacting plant equipped with a pipe still for heating the activated clay and lube stock to about 350° F., and bottom-opening filter presses for removal of the clay.

The bitumen residue from the lubricating oil plant can be varied in melting point to predetermined range by regulating the temperature, pressure and reflux. Gravity-fed overhead settling tanks to which the hard bitumens will be run to a depth of 12 to 18 inches. The bitumen thus accumulated is to be permitted to set and then cut into convenient shipping dimensions. The softer bitumens will be retained at controlled temperatures by heated tanks.

IRAN

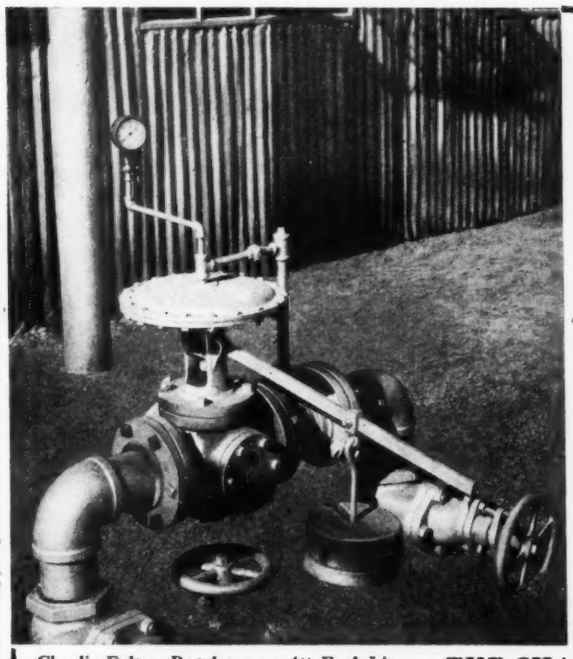
Importance of Iran (Persia) as a producer and refiner of petroleum for world markets was further extended in 1937 when the field increased its crude output to a new record average estimated at 206,645 bbls. per day.

In becoming the fourth largest petroleum producing nation in the world, Iran replaced Rumania, which is suffering a sharp decline from 1936 dropped to sixth position in The Oil and Gas Journal table of estimated production. Elevation of Iran to the rank of fourth largest producing nation was accomplished not alone by Rumania's decline but largely because Iranian output for the year increased by an estimated volume of 12,860,000 bbls., or from a daily average of 171,410 bbls., in 1936 to 206,645 bbls. per day in 1937 calculations. This year's figures include estimates for the last two of the 12 months.

Although one new Iranian field was added to the list of known reserves, the record production peak was established from previously exploited fields at Masjid-i-Sulaiman, Haft Kel and Naft Khaneh.

Continuing its policy of adapting the latest developments in refinery technique to its Abadan plant, Anglo-Iranian Oil Co., Ltd., launched and nearly completed construction in 1937 of a Universal Oil Products catalytic polymerization installation capable of handling about 15,000,000 feet of refinery gases per day. To operate in connection with the polymerization unit, the Abadan refinery is also being equipped with a hydrogenation plant for the production of isooctane. The polymerization plant is in final stages of completion and will be working during the early part of 1938. The hydrogenation installation will be finished and available for use during the middle of the coming year. Anglo-Iranian's hydrogenation plant will operate on polymers for the processing of diisobutylenes to isooctane which in turn will go into production of 100-octane aviation engine gasoline.

Location of the Abadan refinery within reasonable proximity of the producing fields and the abundance of gas developed in cracking Iranian petroleum makes the operation of a polymerization plant for conversion of light gases into high octane motor fuels or for the production of feed stock for the hydrogenation plant particularly practical. Lack of this set of conditions in many foreign countries, with the U.S.S.R., the Dutch East and West Indies and Trinidad the notable exceptions at this time, appears to be a factor definitely limiting ap-



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HOUGH

plication of the polymerization process abroad. In supplying the record demand, Anglo-Iranian was permitted to make full use of its two new atmospheric distillation units placed in service at Abadan in the latter part of 1936. Each of the two distillation units has capacity of 65,000 bbls. daily, the largest of their type in the world.

Much of the increase in demand for Iranian crude and refined products came as a result of reduced output in Rumania and practically complete elimination of the U. S. S. R. as an exporter. Part of the demand previously supplied by those two nations reverted to Iran when they were no longer in position to furnish supplies.

All of the record breaking production came from Iranian fields previously drawn upon due to the existence of pipe line outlets and sufficient reserves to supply even the accelerated rate of withdrawal. Practically all of Iran's 1937 crude output was supplied by Haft Kel and Masjid-i-Sulaiman fields. The previous arrangement by which the Naft-i-Shah field just over the international border from Iraq is drawn upon for the bulk of the national petroleum requirements was undisturbed during 1937.

Of particular importance in the producing activity developments reported in 1937 was the successful completion of large flowing, high pressure wells in the Gach-i-Qaraguli field, about 125 miles southeast of Haft Kel. Final determination that Gach-i-Qaraguli is a cemmercial reserve is one of the Anglo-Iranian moves in settling on the 100,000 square miles of territory it will retain for permanent development. At the end of 1938, the company must reduce its present holdings by half, retaining 100,000 square miles for development during the concession contract with the Iranian government. Large flowing wells have been completed on the northeast and southwest flanks of the Gach-i-Qaraguli structure, the producing capacity ranging up to more than 35,000 bbls. per day. Anglo-Iranian geological and production departments are currently engaged in drilling and studies to determine the limits of the new field.

Existence of production at this particular spot was indicated as long ago as 1928, but the lack of demand for additional oil and inadequate drilling equipment available in Iran at that time for handling the high pressures encountered delayed final determination of the field's existence until the latter part of 1936 and early 1937. The field is about 5 miles east and slightly south of Abadan by air line and a pipe line of length comparable to that transporting Masjid-i-Sulaiman crude to the refinery probably will be required to serve the Gach-i-Qaraguli field, when its production is required.

Rivaling the interest in Anglo-Iranian producing and refining activity in Iran was the completion in the early part of 1937 of negotiations between Amiranian Oil Co., subsidiary of Seaboard Oil Co. of Delaware, and the government for a huge concession in the eastern part of the country. Interest in Amiranian's concession will become even more acute during 1938 when the company will definitely launch drilling operations in selected territories.

Geological parties under direction of Dr. Frederick G. Clapp have been engaged for months in mapping the Amiranian concession and the company is now purchasing equipment in the United States and arranging for its shipment to Iran where drilling will be started by middle of the year. Out of five provinces held in whole or in part under the preliminary exploration convention, Amiranian Oil Co. must select 100,000 square miles by end of the third year after ratification.

Anglo-Iranian's drilling program has uncovered additional evidence of production at Pazanun and Agha Jari, two neighboring points about midway between Haft Kel and the newer Gach-i-Qaraguli structure, but slightly west of a straight line connecting the two proven fields. At Pazanun, Asmari limestone, the producing formation at Masjid-i-Sulaiman and other Iranian fields, was encountered between 5,000 and 6,000 feet showing extremely high gas pressure and a limited amount of distillate production. Due to the exploratory well's position on the anticlinal crest, indications are considered bright for more substantial oil production from this particular structure on the flanks. Crude oil production from the older fields, although withdrawn at increasing rates in 1937, otherwise followed routine procedure patterned along lines of unit control. The plan developed has been particularly successful in controlling reservoir pressure declines with the withdrawal of crude. From Masjid-i-Sulaiman and Haft Kel reservoirs the crude recovery to date has been approximately 755,000,000 bbls.

To care for the additional demand for crude and refined products from Iran in general and Abadan in particular, Anglo-Iranian Oil Co. this year constructed additional tanker loading facilities at Qasba, about 35 or 40 miles below Abadan. It is being used exclusively as a loading terminal for crude oil to relieve the congestion at Abadan of this particular type for shipping and to leave the refinery port open for commerce in refined products. The major refinery construction job at Abadan in 1937 was addition of a Universal Oil Products Co. catalytic polymerization unit capable of processing approximately 15,000,000 crude feet of cracking still gases per day.

Little information is available on the hydrogeneration plant but it is said to be patterned after the successful commercial plants in this country. The most popular and tested procedure in preparation of isooctane, so far as experience in the United States is concerned at least, is by the process of hydrogenating commercial diisobutylene, a product consisting largely of diisobutylene with small amounts of the polymers of iso- and normal butylene and a small percentage of butanes, butylenes and triisobutylene. With completion of the polymerization and hydrogenation plants now under construction at Abadan, the Anglo-Iranian refinery will be equipped to produce the high oc-

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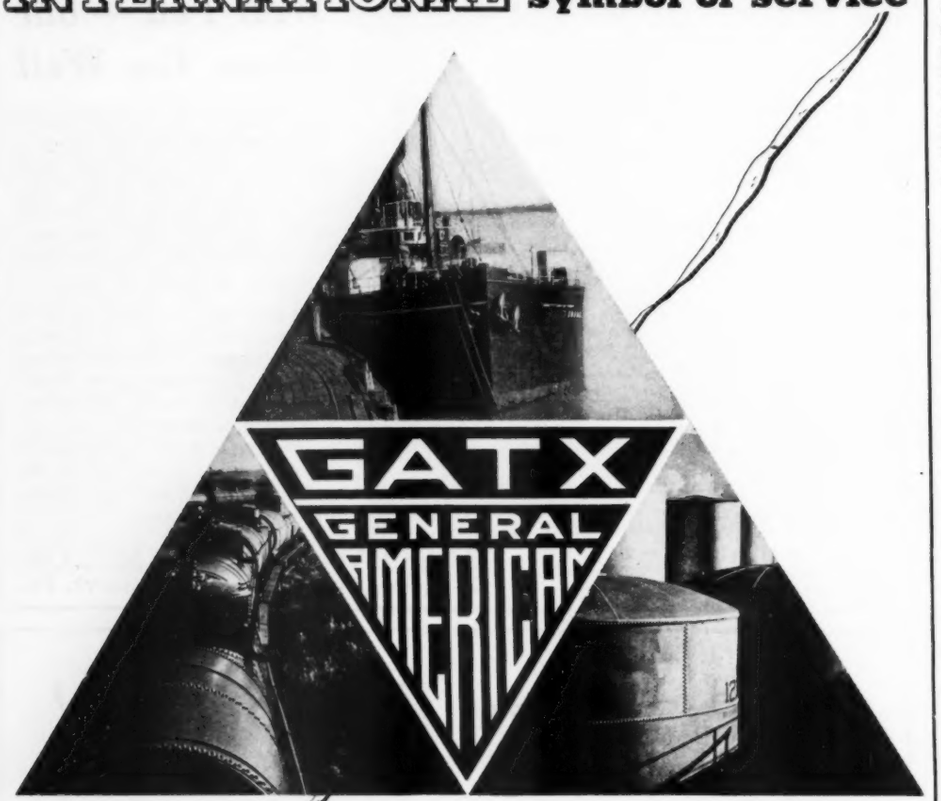

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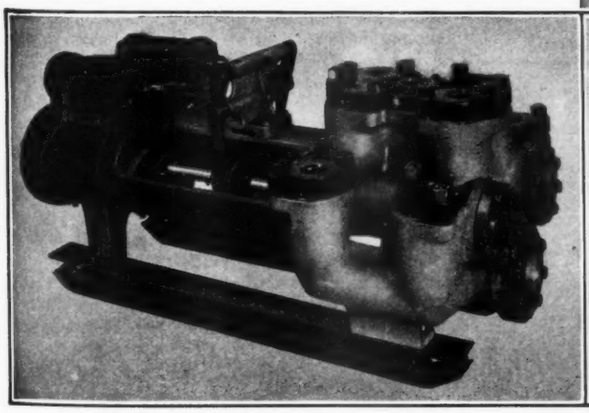

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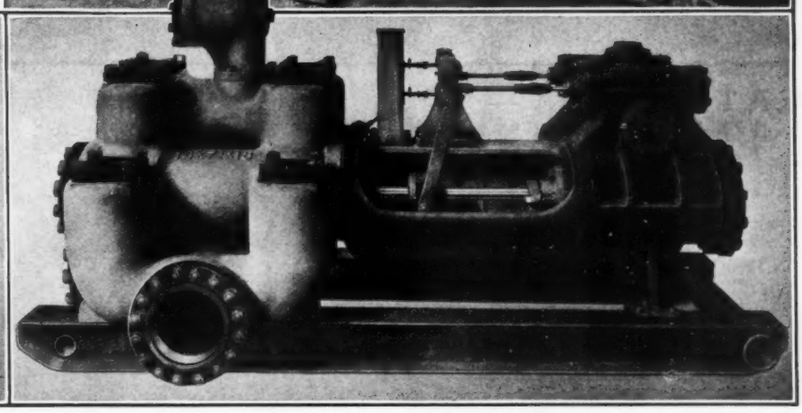

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tane motor fuels now required for military aviation operations and to a growing extent in commercial flying engines. In addition to increasing the octane numbers obtainable by blending iso-octane with other quality motor fuels, the lead susceptibility is materially increased.

No recent additions have been made to the cracking equipment at Abadan. The present equipment has an input capacity of 90,000 bbls. per day. Part of this plant consists of eight Cross-Kellogg units operating at 300 pounds pressure, partly on reforming of naphtha and partly on cracking wax distillate. Additions in 1936 included four new naphtha reforming units operating at 750 pounds pressure.

IRAN CRUDE OIL PRODUCTION

(Figures in Tons)

Month—	1937	1936
January	750,000	668,000
February	631,000	645,000
March	838,000	669,000
April	824,000	616,000
May	827,000	768,000
June	879,000	723,000
July	939,000	696,000
August	952,000	731,000
September	937,000	641,000
Nine months	7,577,000	6,157,000

IRAQ

Iraq's relative position as the eighth largest producer in the world was unchanged from the preceding year, but the country held a firm grip on that rank.

The big problem now facing Iraq Petroleum Co. Ltd., is that of providing additional facilities for movement of crude oil to the world's markets. The company is currently restricted by reason of having reached capacity of the $50,000,000 pipe line system which terminates at Haifa and Tripoli. The 12-inch pipe line originates at the Kirkuk field, divides at Haditha, with one branch running almost due west to Tripoli and the other in a general southwest direction to Haifa, for combined length of 1,510 miles. Its capacity of a little more than 80,000 bbls. daily was reached during the year.

Installation of the stabilization plant at Kirkuk and the starting of its operation during the latter part of 1936 has contributed much to removing natural trade barriers thrown up against Iraq crude because of its sulfur contamination. The stabilization plant consists of three units each capable of handling of 40,000 bbls. of crude per day. One of the three units is a stand-by to insure uninterrupted deliveries of stabilized crude to the pipe line system and to the terminals on the Mediterranean Sea. Operation of this plant was described in detail in The Oil and Gas Journal of February 11, 1937. Throughout the year, the plant has operated in a satisfactory fashion stripping Iraq crude of methane, ethane, hydrogen sulfide, most of the propane and a small portion of butane, leaving most of the valuable light hydrocarbons for benefit of refinery customers.

Outside of the Kirkuk field itself, about which reasonably extensive information has appeared from time to time, Iraq's crude reserves and the operating program remain a mystery. Little is known about British Oil Development Co., Ltd.'s, activity in the 40,000 square mile concession west of the Tigris River and north of the 33° parallel, areas. The Qaiyarah field in the northern part of the B.O.D. concession and just west of the Tigris River remains the only commercial field known to have been obtained on this particular Iraq concession. There remains a question of a year or more duration whether the Qaiyarah field has been proven productive of a light grade of crude oil. Rumors that deeper drilling had uncovered horizons carrying lighter crude have recurred during 1937, but factual data remains obscure.

During the early part of 1937, the old refinery at Qaiyarah was rehabilitated by British Oil Development Co., Ltd., for the production of asphalt from the heavy asphaltic base crude produced from the upper horizons.

Terms of the original Mosul concession, in which the Italian government company, A.G.I.P., held a substantial interest, are not inducive for intense development. Under the concession one-fifth of the production may revert to the government when export shipments of crude oil start, and a royalty payment of four shillings in gold per ton on the remaining 80 per cent, subject to a maximum of 200,000 pounds is imposed. Exemption from internal taxation can be obtained only by payment of a lump sum of 15,000 pounds per 1,000,000 for the first 4,000,000 tons of crude and 20,000 pounds for each subsequent 1,000,000 tons of exports.

IRAQ CRUDE PRODUCTION

Month—	1937	1936
January	352,806	331,594
February	319,109	300,225
March	361,010	358,259
April	356,465	291,909
May	368,564	351,589
June	318,278	352,498
July	340,451	347,828
August	319,990	353,059
September	333,023	268,263
October	357,195	299,011
Ten months	3,426,891	3,254,235
November		315,617
December		314,496
Total 1936		3,884,348

The Kirkuk field is supplying with ease the capacity of the pipe line outlet without need of additional wells. The field now contains about 50 wells capable of producing, but only a few of those completed are required to supply the capacity of the stabilization plant and the pipe line, ranging up to about 85,000 bbls. per day.

These figures are in British tons of 2,240 pounds, convertible to United States barrels by use of the factor of 7.58 bbls. per ton.

Italy and Belgium joined the list of countries in 1937 purchasing Iraq crude for processing. Italy's consumption for the year will total approximately 200,000 tons and Belgium will use about 30,000 tons. France remains the largest customer of Iraq crude. French refiners will accept delivery on nearly 1,500,000 tons of Iraq crude during the year and the United Kingdom will absorb about 300,000 tons in its refinery operations. Most of the remaining production is consigned to "other countries," via Santa Cruz.

Khanaqin Oil Co., Ltd., subsidiary of Anglo-Iranian Oil Co., which operates the Naft Khaneh field in Iraq, increased its activity slightly in keeping with internal consumptive demands. This particular field which extends across the Iraq-Iran border is called Naft-i-Shah in Iran.

The geophysical, aerial and surface studies of all parts of Iraq held under concession continued unabated throughout the year, giving further rise to the prospect that additional outlets will be provided for the production from that country.

The late 1936 development by which Mosul Holdings, Ltd., obtained control of Mosul Oil Fields, Ltd., and the deal by which the former Italian interest was transferred to the participants in Iraq Petroleum has already had some influence on activity of the concern. Exploration work has been accelerated and despite the fact no details of results are available, there is indication that management of the new Mosul set-up is satisfied with the prospects. Inclusion of the Iraq Petroleum Co. interest in the Mosul Holdings may eventually bring about a satisfactory modification of the concession contract which is believed largely responsible for tardy development on a commercial scale. The Iraq Petroleum Co. group has the advantage of long and favorable contact with the government in operating the Kirkuk field.

ITALY

Expansion in Italy's refining facilities was outstanding with further growth assured for 1938. The new "Aquila" S.A. Tecnico-Industriale refinery at Trieste which started operation the latter part of January, 1937, is now handling 9,500 bbls. per day, approximately 40 per cent above the minimum designed capacity.

Of more recent importance are the additions to the Soc. Raffineria di Napoli (Socony-Vacuum) refinery at Naples which were completed in the fall.

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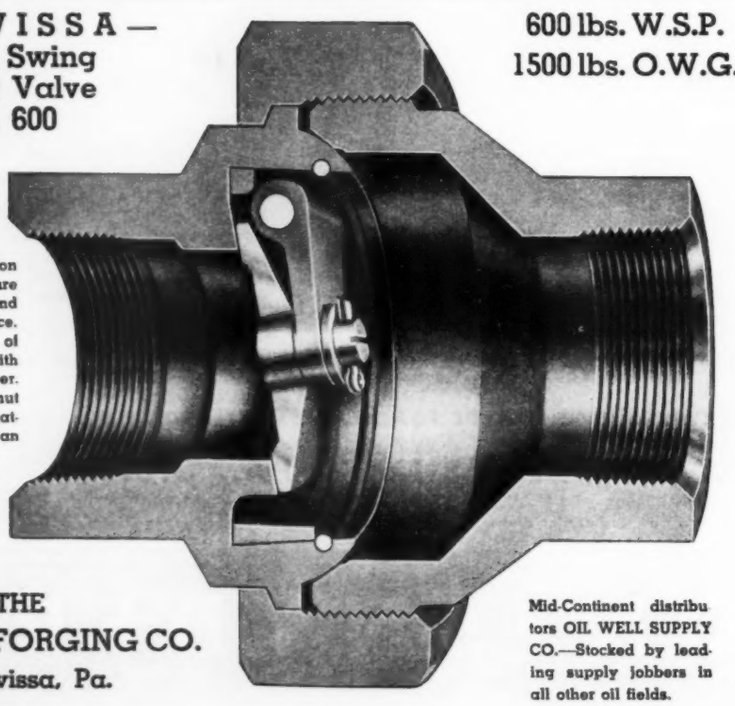

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Under construction at the present time are the two plants for Azienda Nazionale Indrogenazione Combustibili at Bari and Leghorn about which little detail has been made available. It is known, however, that the Bari plant is being equipped to operate on heavy Albanian crude oil. Both the Bari and Leghorn plants include hydrogenation installations for production of motor fuel.

Albanian crude oil, which ranges in gravity from 15 to 20 degrees A.P.I., after experiments conducted at laboratories and pilot plants of the Montecatini chemical concern at Novara and of the German I.G.Farbenindustrie, are reported to have proved satisfactory for production of high octane motor fuel and other products by catalytic hydrogenation in both the liquid and vapor stages. Albanian crude is high in sulfur content and is of asphaltic base.

In dealing with the possibility that Albanian production may be insufficient to supply the two hydrogenation plants under construction both are being built along lines that will permit production of motor fuels and lubricants from oil shales, lignite tars and rock asphalt which may be pressed into service as the source material if conditions arise compeling their use. Italy's dependence on outside sources of petroleum fuels during the East African campaign will not be soon forgotten and the nation is resorting to all means at its disposal to avert the possibility of a petroleum shortage in the event of similar conditions in the future.

From January through August, crude oil imports by Italy increased to 576,062 metric tons compared to 206,887 tons for the same period in 1936. Out of the total imported during the 1937 period, the United States supplied 263,606 metric tons or more than 45 per cent.

EGYPT

Notwithstanding another slight drop in production this year, refinery expansion and modernization programs, involving some $2,000,000 were launched in Egypt, probably predicted in part on prospects. Modification of regulations governing the issuance of exploration permits, licenses and leases has opened up new potential territory to the large international oil companies.

The refinery construction program of Anglo-Egyptian Oilfields, Ltd., includes a new vacuum unit for production of asphalt and a new Dubbs cracking plant to relieve one which has been in service for eight years. The company is expanding its power production facilities, salt-water cooling plant and storage capacity. The Anglo-Egyptian work represents expenditure of approximately $1,250,000.

The Egyptian government (Raffinerie de Petrole du Government) refinery at Suez was extended by addition of a new atmospheric distillation unit built by Foster Wheeler, Ltd. The unit is capable of processing 1,500 bbls. of crude oil per day.

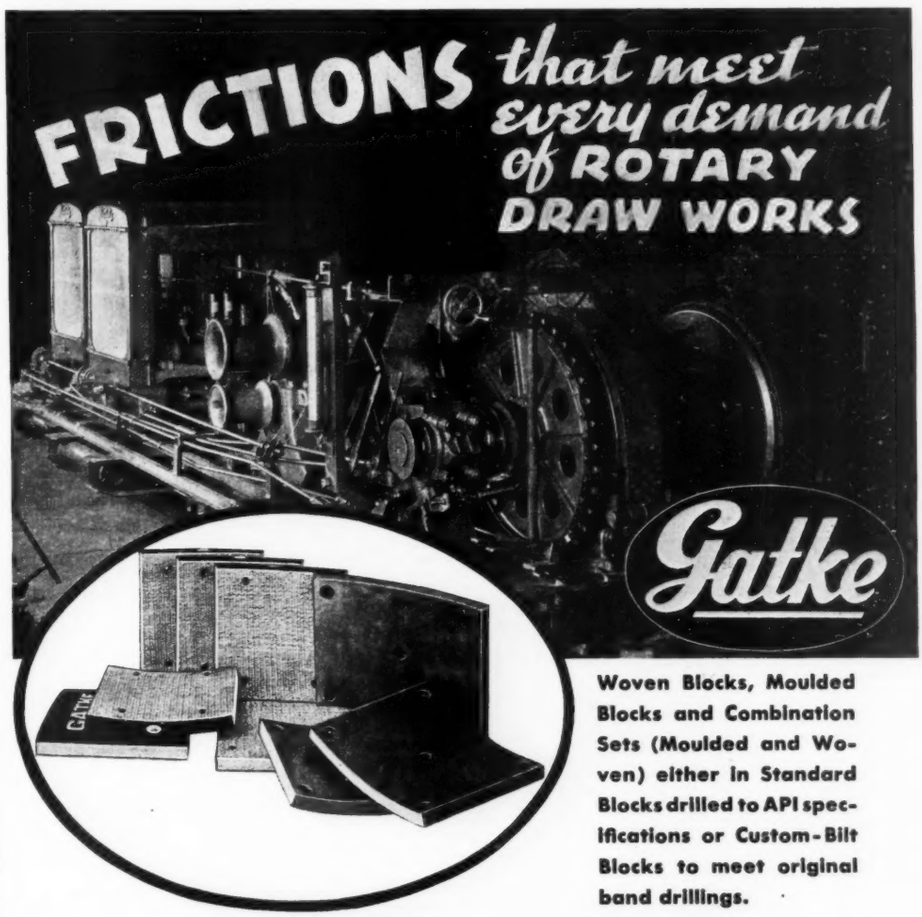
There is a trend toward nationalization of business in Egypt, and the oil marketing companies were subjected to various forms of interference during the year. None of the established marketing concerns gave ground in their struggle to maintain their positions and to meet cooperative companies encouraged by the government. The only new factor entering the Egyptian market was Societe California Texas des Petroles, subsidiary of the California-Texas Oil Co., Ltd., which started marketing bunker fuel oil at Suez and Alexandria, where storage and loading facilities were installed.

The bulk of Egypt's petroleum requirements are supplied by National Petroleum Co. (Shell); Societe Egyptienne des Petroles S.E.P. (Socony-Vacuum); Cooperative Centrale des Petroles (Societe du Naphte, A. I. Maatacheff, S.A.) and Compagnies Generale Egyptienne des Petroles, Alexandria. The last two concerns, formed in 1936, are affiliated with Prahova. In view of the continued decline in Hurghada field production, the revision of mining and leasing laws was practically forced upon Egypt. Anglo-Egyptian Oil Co. was the first to take advantage of the revised laws this year and it obtained permits covering the maximum of 40 areas, each containing 1,000 square kilometers. The Standard Oil Co. of Egypt S.A., subsidiary of Standard Oil Co. of New Jersey, and Socony-Vacuum are the other companies to file applications for the maximum number of areas. D'Arcy Exploration Co., subsidiary of Anglo-Iranian Oil Co., is also reported to have filed applications for certain Egyptian territory. The production from Hurghada field during the year now closing dropped to an estimated total of 1,165,000 bbls., compared to 1,202,000 bbls. in 1936. Deepening operations and efforts to extend the old field have not been successful from a commercial standpoint.

As in the past, Anglo-Egyptian imported more than 75 per cent of its refinery throughput. Imports came chiefly from Iran and Bahrein, which have supplanted Rumania, Russia and American countries as sources of supply because of transportation costs.

Throughout the list of permit applications the traces of the strong international group of companies—Shell, Standard of New Jersey and Socony-Vacuum — predominates. Under the current Egyptian policy of active support to all national industry it is likely that active development will be pushed with all possible speed.

The broad-scale national highway program is opening up new business possibilities in Egypt which are reflected in the consumption of petroleum products, both from a standpoint of motor fuel and from that of asphalts and road oils. The Egyptian type of crude is particularly suited to asphalt production.



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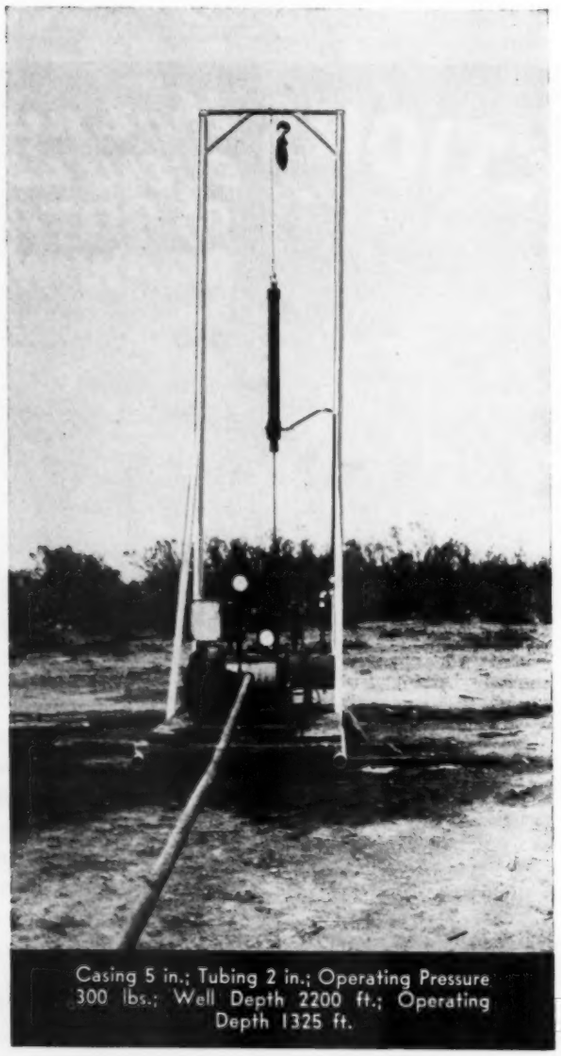

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FIELD OPERATIONS

Summarizing the Week's Developments

The second deep producer in the Fox area, Carter County, Oklahoma, was to be completed for allowable production of 500 bbls. of oil daily, without acidizing; a third deep well in the Fox field was showing for a producer after originally being considered a dry hole. A wildcat in section 18-18-2e, Payne County, was preparing to test showing of oil at 4,762-71 feet.

KANSAS

For the first time since August the Kansas Corporation Commission set an allowable production in excess of the Bureau of Mines recommendation, the January allowable being 186,472 bbls. daily, an increase of 9,772 bbls. above the bureau's estimate. Connection of the Trapp, South Trapp and Southwest Trapp pools of Barton and Russell counties was indicated at a test in section 1-16-14w, Barton County.

TEXAS

The Denver pool in southern Yoakum County, West Texas, was extended easterly, and a probable pool opener is in the process of completion in the extreme northwestern corner of Yoakum County. A 2,410-bbl. well was completed in the Harper pool, Ector County, the best producer thus far in that pool. The Sand Hills Permian lime pay was extended easterly by a 3,217-bbl. well at 4,375-4,435 feet, which had been acidized. A new pool was opened in Jones County, in the King sand, in a test which had been started as a deep test to the Palo Pinto lime. Eighteen new locations were announced for the K.M.A. deep sand horizon in Wichita County, which is estimated to be about 40,000 acres in extent. The McFadden Beach Prospect in Jefferson County, Texas Gulf Coast district, is giving good indications of developing into a pool. The Pickett Ridge field in Wharton County was extended. A shallow pay was opened in the Charenden field in St. Mary Parish, Louisiana Gulf Coast. In Southwest Texas, the Stratton field deep pay in Nueces County was extended 1½ miles and the Luby field, in the same county, was given a mile northeast extension. The northern limit of the Benavides field in Duval County was defined by a 6,018-foot dry hole.

NEW MEXICO

A wildcat 2 miles southwest of the South Eunice pool, Lea County, New Mexico, was showing for 6,000,000 feet of gas. New wildcats were announced in sections 10-18-33, 1-22-36 and 5-23-38 in Lea County, and section 30-20-31, Eddy County.

MICHIGAN

Eleven new oil wells were added to the Buckeye pool in Gladwin County, Michigan. Nine of the 12 permits for new drilling wells issued in the past week were for wildcats.

CALIFORNIA

The Tejon-Grapevine area in Kern County, California, heretofore a gas producing area has a 150-bbl. oil well which is expected to increase to 500 bbls. a day.

NORTH LOUISIANA

A wildcat in Lincoln Parish, Louisiana, with 9 feet of sand logged, promises to develop a new producing area.

Completions in All Fields

(Week Ending December 25, 1937)

	Oil	Gas	Dry	Total	1937 total comp. to date	1936 total comp. to date
N. Y., Pa., W. Va.	78	18	5	101	4,605	3,987
Ohio	3	6	5	14	1,242	890
Indiana	0	0	0	0	129	196
Kentucky	3	4	4	11	720	326
Illinois	8	0	8	16	342	35
Michigan	13	0	2	15	798	795
Kansas	23	3	16	42	2,578	1,721
Oklahoma	17	2	18	37	2,585	2,565
Texas:						
North Central Texas	23	0	13	36	2,663	2,654
West Texas	18	0	9	27	2,632	1,586
Texas Panhandle	12	3	1	16	830	650
East Texas	39	0	1	40	2,387	2,456
East Central Texas	9	0	3	12	702	407
East Texas Border	4	0	0	4	318	194
Gulf Coast Texas	15	1	4	20	1,538	1,226
Southwest Texas	26	7	8	41	3,140	2,851
Total Texas	146	11	39	196	14,210	12,024
North Louisiana	4	2	2	8	661	648
Gulf Coast Louisiana	1	0	0	1	437	392
Total Louisiana	5	2	2	9	1,098	1,040
Arkansas	2	0	1	3	180	89
Montana	1	0	0	1	218	247
Wyoming	1	1	0	2	109	131
Colorado	0	0	1	1	21	29
New Mexico	4	1	1	6	683	552
Utah	0	0	0	0	4	8
California	28	0	6	34	1,496	1,122
Total United States	332	48	108	488	31,018	25,757
Total previous week	400	38	116	554		
Difference	68	10	8	66		

Outstanding Fields—Highlights

(Week Ending December 25, 1937)

FIELD—	Rigs up	Wells drlg.	Weekly oil completions	Initial prod.	Total No. oil wells	Daily av. prod.
TEXAS						
Hastings	5	11	6	5,312	440	19,200
McCampbell	5	7	1	368	92	4,310
Saxet	4	11	4	353	594	42,279
Benavides	3	12	4	458	124	5,936
East Texas	39	114	39	823	24,215	489,450
Talco	0	24	7	1,605	585	31,900
Ector County	20	42	6	6,200	786	25,900
Winkler County	10	8	4	2,350	1,528	41,710
OKLAHOMA						
Fitts	1	14	0	0	948	75,250
Billings deep sand	1	4	2	1,707	59	7,900
KANSAS						
Barton County	7	36	3	2,340	301	13,576
Ellis County	5	20	1	2,310	260	10,028
Rice County	9	24	2	562	1,043	34,254
Russell County	10	44	7	7,336	967	31,500
NEW MEXICO						
Lea County	13	103	4	1,006	1,573	99,520
LA-ARK-TEX						
Rodessa, Ark.	1	12	1	1,440	51	9,740
Rodessa, La.	2	9	2	235	431	44,200
Rodessa, Tex.	4	8	4	1,975	382	18,475
Lisbon, La.	1	13	0	0	153	13,240
Jennings, La.	1	15	1	550	96	15,927
MICHIGAN						
Buckeye	11	50	11	3,700	321	23,492
ILLINOIS						
Central Illinois	11	124	8	2,006	245	23,699
CALIFORNIA						
Wilmington	11	31	7	1,510	326	62,150

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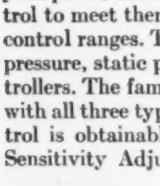
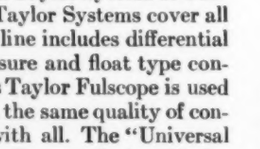


Liquid Level Recorder



External-float Type Liquid Level Controller

Internal-float Type Liquid Level Controller

California Field Report

By
L. P. STOCKMAN

PUMPING WELL CHANGES TO 3,000-BARREL-DAILY GUSHER

LOS ANGELES, Calif., Dec. 27.—With the end of the current year only a few days away it may be safe to say that the California oil industry will start off the new year in excellent shape although a reduction of 10 cents per barrel in fuel oil prices made during the past week has taken a little edge off the outlook for next year.

Universal Consolidated Oil Co., in the Tejon-Grapevine area of Kern County, completed No. 1 Tejon Ranch in section 33-11-19, flowing 150 bbls. of clean 23.1-gravity oil and 2,500,000 feet of gas per day through a 7/64-inch bean, tubing pressure is 1,150 pounds and casing pressure 1,250 pounds, which tend to indicate that the well may be good for 500 bbls. per day when opened up. The first well in this field, No. 3 Tejon of Reserve Oil & Gas Co., is flowing 2,500,000 feet of natural gas per day with only a small amount of crude oil. Petrol Co. recently made a deal with Reserve Oil & Gas Co. whereby the former acquires approximately 1,200 acres from the latter and must begin drilling operations within another 30 days.

Union Oil Co. No. 21 Oil Operators in the northwest end of the Long Beach field, a recent completion pumping 467 bbls. per day from 4,105 feet, began flowing early this week at the rate of 3,000 bbls. per day. The well cut out the fittings and caused considerable work to control it. The well, which built up 876 bbls. on the beam the day following completion, is at present flowing 1,210 bbls. of clean oil and 1,200,000 feet of natural gas per day.

El Segundo

In the El Segundo field of Los Angeles Basin Richfield Oil Co. No. 1-B Santa Fe got out of control and ran wild for several days. This well "got away" at noon December 21 and took fire at 11 o'clock the next morning. The derrick and equipment fell into the cavity at the mouth of the well just before the escaping gas was ignited. This is the third blowout in the El Segundo field since its discovery and all three wells were destroyed. The gas in all three wells is a swamp gas found at approximately 1,800 feet.

Sunshine Oil Co. No. 2 Copinger-Wallace was completed flowing 680 bbls. of clean 25.1 gravity oil daily from 7,126 feet, production coming through a 1-inch bean under tubing and casing pressures of 180 pounds and 475 pounds respectively. Richfield Oil Corp. completed No. 1 McCray flowing 1,035 bbls. of clean 21.8 gravity oil and 450,000 feet of natural gas daily from 7,235 feet. This well is flowing through a 1-inch bean under a tubing pressure of 160 pounds and a casing pressure of 190 pounds. Standard Oil Co. No. 4 Refinery has been completed at 7,474 feet but the output 760 bbls. daily is cutting 70 per cent and the company may go back into the hole for remedial work.

Ventura-Newhall

Barnsdall Oil Co.'s second well in the Newhall area of Los Angeles Basin picked up the top of the pay at 6,043 feet and was still in oil sand at 6,063 feet. This well which is located near Castaic station is approximately 120 feet higher structurally than the discovery well now producing 160 bbls. of clean 35.1 gravity oil and 100,000 feet of natural gas daily. Barnsdall Oil Co. under supervision of R. A. Broomfield discovered this new field last year but its true potentialities have not yet been determined. The company holds 4,000 acres around the well which includes the Rancho San Francisco on which the new well is located in section 26-4-17. Shell Oil Co. holds extensive acreage in this general area and Continental Oil Co. and Ohio Oil Co. hold similar properties under lease.

Wilmington

Union Pacific Railroad Co. No. 59 in the Wilmington field was completed flowing 370 bbls. of 19.7 gravity oil daily from 3,347 feet and its No. 66 was completed flowing 220 bbls. of 17.4 gravity oil per day from 3,271 feet, after the well had been carried down to 3,358 feet and plugged back to the completion depth. General Petroleum Corp. completed No. 9 Terminal flowing 100 bbls. of 19.1 gravity oil through a 40/64-inch bean daily from 3,015 feet. This well had not yet cleaned up and may show a much larger production in a few days. Bankline Oil Co. completed No. 12 D. H. C., pumping 165 bbls. of relatively clean 18.3 gravity oil per day from 3,361 feet. Royalty Service Corp. completed No. 1-K flowing 345 bbls. of 16.9 gravity oil daily from 3,647 feet. Black Gold Oil Co.'s No. 6 Wilmington was completed, doing 190 bbls. of 17.2 gravity oil per day from 3,637 feet and V. R. Wilbur brought in his No. 2 Santa Fe pumping 120 bbls. of 15.4 gravity oil daily from 3,698 feet.

Santa Maria

In the Santa Maria Valley field, Signal Oil & Gas Co. completed its second good well, No. 1 Highway in section 26-10-34, flowing 640 bbls. of 15.8 gravity oil daily from 4,432 feet. Top of the Franciscan basement was logged at 4,378 feet. Pacific Western Oil Co. completed an exceptionally good well in No. 2 Dal Parto, flowing 2,270 bbls. of 16.8 gravity oil cutting 3 per cent daily from 4,256 feet. Top of the Franciscan was logged at 4,250 feet and the hole was finished with 336 feet of 6⅝-inch perforated liner landed on bottom. Sunshine Oil Co. completed No. 2 Wallace in section 27-10-34 flowing 1,010 bbls. of relatively clean 16.8 gravity oil through a three-fourths inch bean per day from 4,403 feet. This new well was finished with 441 feet of 6⅝-inch liner including 403 feet of perforated. Frank Jones' No. 1 Gallison in section 26-10-34 was finished, flowing 610 bbls. of 17.8 gravity oil per day from 5,090 feet after the hole had been carried down to 5,197 feet and then plugged back to the completion depth. It was finished with 581 feet of 6⅝-inch liner including 559 feet of perforated and is flowing through a 1½-inch bean and pressure is still increasing.

Kettleman North Dome

Standard Oil Co. in the Kettleman North Dome field completed No. 27-33-J in section 33-21-17. It showed an initial daily production of 1,024 bbls. of clean 34.5 gravity oil and 440,000 feet of natural gas. This new well which failed to show any free water was bottomed at 8,530 feet in rocks of Temblor formation. Superior Oil Co. which is drilling a deep test down to the Eocene which was found productive by Kettleman North Dome Association several months ago is hung up with another fishing job and it may be another several weeks before drilling is resumed. Superior's well in question is No. 5 Huffman in section 29-21-17 and it is down 10,369 feet. Bandini Petro-

(Continued on Page 320)

STANDARD OIL CO. OF CALIFORNIA AND UNION OIL CO.
Crude oil prices at the well effective June 22, 1936

Gravity—	Signal Hill (Long Beach)	Seal Beach	Alamitos Heights	Huntington Beach	Inglewood	Playa del Rey	Olinda-Brea Canyon	Athens-Rosecrans	Dominguez	Elwood Terrace	Torrance	Richfield	Whittier E. Coyote (La Habra)	Montebello	W. Coyote Hills	Santa Fe Springs	Mountain View	Elk Hills Buena Vista Hills Midway-Sunset Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge	Kettleman Hills	Santa Paula*	Orcutt*
14-14.9	$ 80	$ 79	$ 74	$ 78	$ 79	$ 80	$ 76				$ 80	$ 76	$ 76	$ 77	$ 78			$ 70	$ 70	$ 70			$ 70	
15-15.9	80	79	74	78	79	80	76				80	76	76	77	78			70	70	70			70	
16-16.9	80	79	74	78	79	80	76				80	76	76	77	78			70	70	70			70	$ 70
17-17.9	80	79	74	78	81	80	76				80	76	76	77	78			70	70	70			71	70
18-18.9	80	79	74	78	84	80	78				82	76	76	77	78			70	70	70			73	72
19-19.9	82	79	74	82	87	84	81				85	76	78	77	78		$ 70	74	74	71	$ 70		75	74
20-20.9	85	79	74	85	90	88	84				88	78	82	77	80		70	78	78	72	70		77	77
21-21.9	88	79	74	89	93	93	88				91	80	85	77	84	$ 78	73	82	82	74	70		79	80
22-22.9	92	82	74	92	96	98	92				93	84	89	79	88	78	77	87	86	78	72		82	83
23-23.9	95	86	77	96	.99	1.02	96	$ .84	$ .79		96	88	93	82	92	76	80	92	90	82	76		85	86
24-24.9	99	91	80	1 00	1.02	1 06	99	88	81		99	91	96	85	96	82	84	97	94	86	79		87	88
25-25.9	1 03	95	82	1 03	1.05	1 11	1.03	93	83		1 02	95		89	99	86	88	1 01	98	90	83		90	91
26-26.9	1 06	1 00	85	1.07	1.09	1.16	1.06	98	86		1.05	98		92	1 03	90	91	1 06	1 02				92	93
27-27.9	1 10	1.05	88	1.11	1.12	....	1.10	1.03	88		....	1.02	....	96	1.06	95	95	1.10	1 06				95	
28-28.9	1 14	1 10	90	1.14	1.15	....	1.14	1.07	90		....	1.06	....	99	1 10	99	99	1 15	1 10				97	
29-29.9	1 17	1 15	93	1 18	1.18	F.O.B.	1.17	1.12	93		....	1.09	....	1.03	1.14	1.03	1.02	1.20	1 14				99	
30-30.9	1 21	1 19	95	1 22	1.21	our	1.21	1.17	95	F.O.B.	....	....	....	1.07	1.17	1.08	1.06	1.25	1 18				1 01	
31-31.9					1.24	Pipe	1.24	1.22	97	Ship	....	....	....	1.11	1.21	1.12	1.09	1 29						
32-32.9					1 27	Line	1.27	1.27	1.00	....	....	....	....	1.14	1.25	1.16	1.13	1 34						
33-33.9								1.32	....	$1.28	....	....	....	1.18	1.28	1.20	1.17	1 38				$1 19		
34-34.9								1.37	....	1.32	....	....	....	1.22	1.32	1.25	1.20					1 23		
35-35.9								1.42	....	1.35	....	....	....	1.25	....	1.29	....					1 27		
36-36.9								1.46	....	1 39	....	....	....	1.29	....	1.33	....					1 31		
37-37.9								1 51	....	1 43	....	....	....	1.32	....	1.37	....					1 35		
38-38.9								1 56	....	....	....	....	....	1.36	....	1 42	....					1 39		
39-39.9								1 61	....	....	....	....	....	1.40	....	....	....					1 43		
40-40.9								1 66	....	....	....	....	....	1.43	....	....	....							

Newhall, McKittrick, Kern River, Kern Front and Round Mountain, 70 cents for all grades. *Posted by Union Oil Co. Same company's Brea Canyon schedule stops at $1.14 for 28 degrees and over, and Belridge and Lost Hills schedule stops at $1.32 for 37 degrees and over. By Standard Oil Co., effective October 15: El Segundo, 14 to 18.9 degrees, 80 cents; 19-19.9, 82 cents; 20-20.9, 85 cents; 21-21.9, 88 cents; 22-22.9, 92 cents; 23-23.9, 95 cents; 24-24.9, 99 cents; 25-25.9, $1.03; 26-26.9, $1.06; 27-27.9, $1.10; 28-28.9 $1.14; 29-29.9, $1.17; 30-30.9, $1.21. Wilmington, 14 to 16.9, 75 cents; 17-17.9, 77 cents 18-18.9, 79 cents; from 19 degrees upward, prices same as Signal Hill.

Southwest Texas District

By
F. L. SINGLETON

SEVERAL POOL EXTENSIONS; BENAVIDES NORTH CUT-OFF

CORPUS CHRISTI, Tex., Dec. 27.—Although the holiday season has resulted in a general decline in drilling operations throughout the Southwest Texas district, several exensions and probable new strikes drew considerable attention.

Five miles southwest of Telfener, Victoria County, W. V. Bowles was preparing to make a production test at No. 1 Robertson after two drill stem tests showed favorable indications. The first test was made at 5,100-10 feet and showed 110 feet of pipe line oil and 30 feet of drilling mud, while the second test, made at 5,110-12 feet, showed 5 pounds of pressure and approximately 90 feet of drilling mud, cut with oil, was recovered. The hole was cored to a total depth of 5,114 feet and a production string of 7-inch casing was cemented at 5,100 feet. This well has been the center of interest for the past several weeks and was drilled to a total depth of 6,121 feet. An additional showing was found in the Frio formation around 5,600 feet and a drill stem test showed some oil along with lots of salt water.

The prospective pool opener is located in the Thomas C. Burnham Survey, on a block of approximately 2,250 acres, about 5 miles west of the Keeran field and 10 miles northwest of the Placedo field. The completion of the well for a commercial producer will intensity an already active leasing and royalty buying campaign which has resulted from recent developments along the same general trend.

Extend Stratton Field Deep Pay

The 6,400-foot pay at the Stratton field, Nueces County, was extended about 1½ miles north with the completion of Camp Production Co. No. 3 Wardner, section 12, Stratton Ranch Subdivision. Oil sand was logged at 6,405-17 feet, total depth, and it is flowing at the rate of 5 bbls. of 54.5-gravity distillate per hour through a quarter-inch choke with tubing pressure 2,250 pounds and casing pressure 2,500 pounds.

In the same county, but in the Luby field, Richardson Petroleum Co. No. 1 Chapman, 1 mile southeast of production, was being completed through perforated casing but no gauge was available. Sand with a good showing was logged from 5,409-24 feet. In the field proper, Seaboard Oil Corp. No. 3 Shaffer has been completed for one of the largest producers in the field. On a 24-hour gauge through a one-eighth inch choke it flowed 190 bbls. of pipe line oil. Production is from perforations at 5,405-67 feet. Stanolind Oil & Gas Co. No. 1 Spessard is running screen for a completion test in sand bottomed at 4,324 feet while the same company's No. 3 John Luby cored sand from 5,052-71 feet and 7-inch casing was cemented on bottom.

Northwest of the Agua Dulce field and located in Survey 419, L. A. Douglas cored sand with a slight oil show at 5,352-58 feet, but on a 15-minute drill stem test at 5,344-58 feet it tested 3,400 feet of salt water, with no showing of oil and gas. It is coring ahead.

Along the Jackson trend, C. Hannah No. 1 Wedding, B. Haughey Survey, has attracted attention, as the operators are trying to kill the well after it blew out from a total depth of 2,120 feet. It is flowing gas and salt water through the surface casing. The well is being drilled as a "mystery" and little information can be obtained on the formation from which it blew out. In the adjoining county to the south, Magnolia Petroleum Co. has staked location for No. 8 Seeligson to be drilled in the recently opened East Premont field in Jim Wells County.

In Goliad County, Rual Swiger No. 1-B Wood, 12 miles south of the town of Goliad, swabbed approximately 10 bbls. of oil per day through perforated casing at 5,009-18 feet and it is now shut down until after the holidays.

In the Laredo district, prospects of opening the first oil production in the Las Animas gas field, Jim Hogg County, were considered good following a drill stem test at Darby Petroleum Co. No. 2-B Holbein, which showed pipe line oil with some salt water. The test was made through perforated casing at 1,826-28 feet and the hole filled with 1,000 feet of fluid in 30 minutes of which 800 feet was pipe line oil and the balance salt water. The perforations have been squeezed off and another test is scheduled to be made from 1,820-24 feet. Previous development from the same sand section has resulted in gas production.

Another shallow field for Webb County was indicated by the showing of H. E. Nessley No. 3 Bruni, C.&M. R.R. Survey No. 449. Gas sand was logged from 1,790-1,807 feet, the last three feet saturated with oil. A drill stem test at 1,790-1,807 feet showed 250 pounds of working pressure, with no show of oil distillate or salt water. It is coring ahead.

Benavides Cut Off on North

The northern limits of the Benavides field, Duval County, were defined with the abandonment of Frank Gravis No. 1-A Vaello-Puig, which was finished in the Yegua formation at a total depth of 6,018 feet. Slight showings were logged in both the 4,700- and 5,300-foot sands, but drill stem tests recovered salt water with slight gas showings. On the extreme southwestern side of the field, Circle Oil Co. No. 1-A West is reported to have been completed for a dry gas well in the 3,900-foot sand, referred to by some as the Cole sand. This is the first completion in this sand section, although practically all wells toward the main part of the field have logged the sand and drill stem tests have showed oil and gas in commercial quantities.

A short extension to the Seven Sisters field, Duval County, was indicated by Reynosa Oil Co. No. 1-A Garza De Rodriquez, which recovered 270 feet of oil on a drill stem test at 1,484-90 feet. The completion of this well may result in increased activity.

Two miles north of the Killam field, Kirkwood & Morgan No. 1 Garcia-Villareal, T. Poitevent Survey, perforated casing at 1,966-75 feet and was completed for an initial of 10,000,000 feet of dry gas daily. One mile north of the Oilton field, J. R. B. Moore No. 1 Garcia-Villareal, S.M.&S. Survey, perforated casing at 2,430-35 feet and is producing dry gas.

In the town of Rosita, Starr County, W. W. Ely No. 1 M. G. Gonzales is being watched with interest after coring sand showing gas. Sand with a possible showing of gas in the ditch was reported at 770-795 feet; from 970-95 feet sand and shale showing gas was recovered, and from 1,310-50 feet sand with an odor of gas was logged. It is drilling in shale below 1,691 feet. In the northeastern part of the county, J. L. Collins and others No. 1 Guerra, a deep test, is coring sand below 6,294 feet. Additional gas showings have been logged from 6,181-87 feet and 6,191-95 feet and at 6,224-27 feet where the well attempted to blow out.

Balcones Fault Area

Along the Balcones Fault line, H. F. Wilcox Oil & Gas Co. No. 2 Gillam, Batesville area, Zavalla County, drilled to a total depth of 3,983 feet in the Edwards lime and is plugging back to 3,958 feet where production test is scheduled to be made of the Georgetown lime at 3,925-40 feet. In the Nash Creek field, Guadalupe County, Kallison and others No. 1 Howell, south of the discovery well, drilled to the Edwards lime and has been abandoned at a total depth of 3,274 feet. Same operator's No. 1 Burris, Iva Nash Survey, is bottomed in the Taylor formation at 2,395 feet.

Stop Gas Waste

Development of the deep LaBlanca field, Hidalgo County, in the Rio Grande Valley area, will be retarded as a result of an order issued the past week by the Railroad Commission which has instructed all operators to shut in their wells except those that are selling natural gas for industrial use. The order affects six 7,800-foot wells. The LaBlanca structure is believed to be one of the largest deep-seated structures in the district. The field is undefined and covers an area of 2½ miles in length and about 1½ miles in width. The railroad commission issued the order after making a series of potential tests which showed a large wastage of natural gas. The wells are capable of making from 90 to 100 bbls. of distillate per day and from 8,000,000 to 12,000,000 feet of gas. The gas-oil ratio on many of the wells is reported to have been as high as 80,000 feet of gas to 1 bbl. of oil. The field was extended 1 mile to the west the past week with the completion of Gulf States Oil Co. No. 1 Delta Orchards, which is flowing into the pits with no gauge reported. Production is from perforations at 7,880-88 feet.

COMPLETIONS SOUTH TEXAS DISTRICT

Completed wells in the proven fields, with their total depth, and the initial 24-hour production of the producing wells are as follows:

Aransas County

McCampbell field: Atlantic Refining Co. No. 7-B Porterfield, 7,225 feet, 368 bbls., three-eighths inch choke.

Caldwell County

Buchanan field Carter, Stewart and Ramos, 2,322 feet, abandoned.

Duval County

Benavides field: Hiawatha Oil & Gas Co., 4,817 feet, 96 bbls., one-eighth inch choke; Standard Oil Co. of Kansas, 4,784 feet, 194 bbls., three-sixteenths inch choke; Standard Oil Co. of Kansas No. 11 Rossi, 4,799 feet, 88 bbls., three-sixteenths inch choke. Hoffman field: Cox & Hamon No. 4 Cuellar Brothers, 2,714 feet, 80 bbls., three-eighths inch choke; Cox & Hamon No. 3 Cueller Brothers, 2,600 feet, 100 bbls. Sweden field: Hiawatha Oil & Gas Co. No. 3 Herberger, 5,843 feet, 124 bbls., one-eighth inch choke.

Guadalupe County

Gulf Oil Corp. No. 8 Dix, 2,511 feet, 85 bbls. pumping.

Jim Hogg County

Henne-Winch Farris field: Barnett Petroleum Co., 2,405 feet, abandoned.

Goliad County

North Pettus: Jane Oil Co. No. 3 Mudd, 3,709 feet, 40 bbls., three-eighths inch choke.

Karnes County

South Burnell field: Luling Oil & Gas Co. No. 14 Boyce, 3,644 feet, 158 bbls., five-thirty-seconds inch choke.

McMullen County

Ezzell field: Harry Ezzell No. 1-D Ezzell, 1,506 feet, gas well; Harry Ezzell No. 2-D Ezzell, 1,495 feet, gas well; Harry Ezzell No. 3-D fee, 1,729 feet, gas well; Harry Ezzell No. 4-D fee, oil sand 1,486-94 feet, gas well. Mike Glasscock No. 1 Wood, 1,457 feet, 150 bbls. pumping. Jacobs field: National Petroleum Co. No. 5-C Lark, 991 feet, 20 bbls. pumping.

Nueces County

Flour Bluff field: Humble Oil & Refining Co. No. 2 Chapman, 6,657 feet, 176 bbls., one-eighth inch choke; Southern Minerals Corp No. 3 King, 4,015 feet, perforated casing 4,012-15 feet, 1,500,000 feet of gas. Saxet field: Houston Oil Co. No. 5 Hunter, 4,868 feet, 97 bbls.,

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McKissick Tubing Bleeders and Standing Valves.
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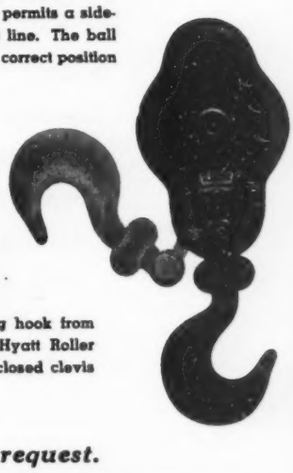

Descriptive literature fully illustrated will be gladly furnished on request.

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open tubing; Crown Central Oil Co. No. 6 Page, 4,420 feet, 75 bbls., seven-sixteenths inch choke; Houston Oil Co. No. 32 Morgan, oil sand 4,809-59 feet, 75 bbls. 12 hours, three-eighths inch choke; H. H. Howell No. 7 Hutchins, 6,762 feet, 106 bbls., three-sixteenths inch choke.

Refugio County

Fred Shields No. 2 Ryalls Estate, perforated casing 6,780-94 feet, 170 bbls. distillate, five-sixteenths inch choke; Tomoconnor field: Nordan & Morris No. 2 O'Connor, perforated casing 5,917-27 feet, 604 bbls., quarter-inch choke.

San Patricio County

Taft field: Humble Oil & Refining Co. No. 31 Mayo, 4,366 feet, 159 bbls., five-thirty-seconds inch choke.

Webb County

Killam field: French Oil Co. No. 8 Perez, oil sand 1,995 feet, 2,003 feet, 42 bbls. pumping; Eugene Mays No. 4 Dickens, oil sand 1,990-92 feet, 30 bbls. pumping, 25 per cent salt water. Oilton field: J. M. Anderson No. 3 J. M. Martin, oil sand 1,890-1,903 feet, 150 bbls. pumping; Cox & Hamon No. 8 Martin, 1,909 feet, 145 bbls. pumping; Hamil & Smith No. 11 Martin, location abandoned.

California Fields

(Continued from Page 317)

leum Co. which acquired two abandoned wells and acreage that had been quitclaimed by Tide Water Associated Oil Co. several months ago has started making new hole in No. 5 Whepley at 8,414 feet. This well located out on the north flank of the structure in the Feliz-Whepley area will be carried down to the Eocene as a deep test. Up to the present the Eocene has only been found productive in the Huffman area in the extreme western end of the field and the outcome of work on No. 5 Whepley will therefore prove interesting. In the Kettleman Middle Dome field Temblor Oil Co. is preparing to make a production test on No. 1 Bunting in section 25-23-18 with bottom of the hole at 9,138 feet. A 4¾-inch blank liner 960 feet in length was expected to be landed in the bottom of the hole but it froze at 8,958 feet. The hole was cleaned out to bottom and a formation test at 8,958-9,138 feet resulted in a recovery of 32 stands of gas cut mud showing considerable gas with oil showings negligible. It is the present intention to land a 3-inch liner on bottom and proceed with a production test. This well has at times looked rather good and the impending production test will be watched with interest especially since a completion will extend the productive limits of the field

New York-Penna. Gas Fields

COUDERSPORT, Pa., Dec. 27.—Two more wells were completed in the Woodhull field, most active area in the New York-Pennsylvania deep sand gas fields, during ing the past week. They brought the total of consecutive completions in this Steuben County, New York, field, opened in May, to 19. In addition, four other tests reached the Onondaga and are due for completion soon.

J. Becker completed his test on the Fred Sly farm in Woodhull Township at a total depth of 4,085 feet with an initial open flow of 20,000,000 feet. This well topped the Oriskany at 4,071 feet and was drilled 14 feet into the sand.

New York State Natural Gas Co. completed its test on the Chester L. Bonham farm at a total depth of 4,004 feet with an initial open flow of 5,000,000 feet. The Oriskany sand was reached at 3,987 feet and the first gas encountered at 3,991 feet.

Pennsylvania Operations

Both of the New York State Natural Gas Co. tests in Harrison Township, Potter County, reached the Onondaga during the past week and casing has been run and cemented in each. The A. D. Marble farm test topped the Onondaga at 5,033 feet and has been drilled to 5,054 feet. The A. Schofield No. 2 farm test topped the formation at 4,933 feet and has been drilled to 4,954 feet.

Potter Development Co.'s test on the Crawford farm in Keating Township is reported drilling at 6,962 feet. This company is shut down at 5,700 feet on the Haupt farm, its West Branch Township wildcat test. Ward Wasson is also shut down at 5,180 feet on the R. B. Hall farm, Genesee Township, and French and others are shut down after completing the rig on the H. O. Perry farm, same township.

Evjen and others have resumed drilling in their test on the Dusenberry farm in Watson Township, Warren County, while on the other two current tests in this county, those of Updegraff on the O. E. Erickson farm, Elk Township, and Kane Industrial Gas Co. on Lot 515, Watson Township, remain shut down at 4,830 feet and 4,435 feet, respectively. McKenry and others are shut down for rig repairs at 4,440 feet in their Stellman farm wildcat, Rockland Township, Venango County.

New York Operations

Two more Woodhull field tests reached the Onondaga in the past week. Southwestern Development Co. is running pipe in its hole on the E. G. Husted farm, where the Onondaga was reached at 3,783 feet. Present depth of this test on the Earl Brown farm, drilled to a depth of 3,960 feet.

New York State Natural Gas Co. is casing its well on the Charles Finch farm, drilled to 4,010 feet after topping the Onondaga at 3,981 feet.

Sylvania Corp. is drilling at 3,385 feet on the John Allen farm, where the Tully was found at 3,288-3,343 feet, and at 3,570 feet on the E. G. Husted farm, where the Tully was found at 3,373-3,426 feet.

Clancy and others are drilling at 2,727 feet on the M. Hargraves farm and Belmont Quadrangle Drilling Co. at 1,205 feet on the John Allen farm. Williamsport Oil & Gas Co. is prepared to resume drilling on the Della Lampson farm, where the new equipment has been installed.

New York State Natural Gas Co. reached the Onondaga at 4,953 feet on the A. Schaul farm in Troupsburg Township, Steuben County, and is now drilling at 4,980 feet. This company is drilling at 2,283 feet on the Franklin Miller farm, same township.

Southwestern Development Co. is drilling at 6,352 feet on the Federal Land Bank farm, Montour Township, Schuyler County, and at 2,200 feet on the Johnson Estate farm, Willing Township, Allegany County.

Belmont Quadrangle Drilling Co. has the rig up and is ready to start drilling on a test on the F. Hilligas farm, Willing Township, and Empire Producing Co. is still shut down at 200 feet on the Della Mulvey farm, Alma Township, Allegeny County.

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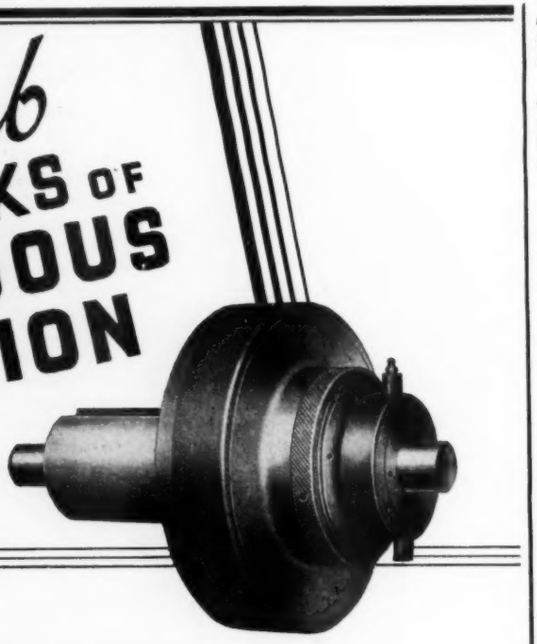

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Kansas Developments

By
DAL DALRYMPLE

JANUARY CRUDE ALLOWABLE INCREASED BY COMMISSION

Allowable production of crude oil in Kansas during January was set at 186,472 bbls. daily by the Corporation Commission, an increase of 9,772 bbls. above the recommendation of the Bureau of Mines. This is the first time since September that the Kansas crude oil allowable has been greater than the bureau recommendation. Prior to last May the commission exceeded bureau figures in setting the allowables, from May to August it accepted the bureau's estimates and since August it has set an allowable under the recommendations.

The change in policy was announced after E. B. Shawver, president of the new Kansas Independent Oil & Gas Association, testified that pipe line capacity in the state is 207,000 bbls. daily, and urged that production of at least 186,000 bbls. daily be allowed to improve the Kansas industry's position among other oil states.

The commission, at the outset of the hearing, said it desired to see the state produce all the oil for which there was a market that can be produced without causing underground waste. The commissioners pointed out it was not within the scope of either the commission or the state to find a market, that being left to the industry.

Activity Increases

Field activity increased in Kansas somewhat the past week, with 23 oil wells being completed as against 14 the previous week. Oil producers, gas wells and dry holes completed the past week totaled 42, an increase of 11 over the previous week.

Shell Petroleum Corp. No. 1 J. J. Stettinger, NE NW SE section 1-16-14w, Barton County, indicated it will be a connecting link between the Trapp, South Trapp and Southwest Trapp pools of Barton and Russell counties. It recovered a saturated core at 3,344-49 feet, and operators set casing preparatory to completing the test. It is one-half mile south of production in the Trapp pool, and one-half mile northwest of the same operator's No. 1 Ehrlich, SW cor. section 1-16-14w, which opened the southwest Trapp area.

The newly opened South Andover pool of Sedgwick County was extended across the line into Butler County at National Refining Co. No. 1 Elmer Pray, SW NW SW section 31-27-3e. It tested 14,000,000 feet of gas from Stalnaker sand topped at 1,999 feet, total depth 2,022 feet. The well will be deepened to Wilcox sand in search of oil. The discovery well recently was completed for 189 bbls. of oil daily.

The Winfield Arbuckle lime pool of Cowley County was extended three-fourths mile west at Wakefield and others No. 1 Whitson, SE NE NE SE section 8-32-4e. It had the lime at 3,285-94 feet, total depth, and was estimated good for 75 bbls. of oil daily.

A Pawnee Producer

Mid-Continent Petroleum Corp. No. 1 Bixby, NW cor. section 24-20-16w, Pawnee Rock area, Pawnee County, made potential of 252 bbls. of oil daily from Arbuckle formation at 3,621 feet, total depth.

Stanolind Oil & Gas Co. No. 1 George Walker, NE NE SW section 33-21-12w, Stafford County, was drilling below 3,565 feet, seeking the Arbuckle lime. It passed up showings in Kansas City lime, principal producing horizon in the Sittner pool, three-fourths of a mile northeast.

S. P. Faulkner No. 1 Moses Estate, SW NW SE section 9-22-13w, wildcat two miles south of Seward in Stafford County, had slight showings of oil in the base of Kansas City lime and was drilling ahead below 3,632 feet.

Atlantic Refining Co. No. 1-B McNaghten, NW cor. section 27-24-13w, three-fourths mile west of the St. John pool, Stafford County, was due to take potential. It was bottomed at 4,091 feet, where it tested 50 bbls. of oil an hour.

Helmerich & Payne No. 1 Hoeme, SE SE NE section 20-26-12w, wildcat in Pratt County, was drilling ahead below 4,152 feet, with nothing showing.

Estimated Daily Production

Estimated daily production of Kansas for the week ending December 25 and for the preceding week was as follows:

	Barrels	
	Dec. 25	Dec. 18
Oxford City	1,300	1,200
Burrton	10,175	10,200
Ritz-Canton	5,200	5,225
Graber	3,175	2,525
Hollow-Nikkel	2,300	2,275
Lerado	1,450	1,175
Voshell	2,075	2,050
Wellington	2,675	2,650
Ellsworth County:		
Lorraine	3,360	3,350
Other pools	1,140	1,135
Rice-Barton counties:		
Bloomer	4,225	3,500
Chase	4,525	5,450
Geneseo	2,300	2,250
Raymond	1,500	1,075
Silica	14,825	14,650
Keesling	1,175	1,050
Hauschild	1,150	1,300
Miscellaneous Rice	8,780	8,520
Miscellaneous Barton	9,350	8,340
Russell County:		
Fairport	1,695	1,690
Gorham	1,615	1,600
Russell	2,030	2,015
Sullivan	6,755	6,740
North Trapp	11,320	11,295
Miscellaneous Russell	8,085	7,890
Sedgwick County:		
Valley Center	1,065	1,070
Miscellaneous	2,485	2,510
Ellis County:		
Bemis	5,850	6,900
Miscellaneous	4,180	3,130
Kingman County	695	770
Stafford County	3,405	3,420
Greenwood County	9,825	9,850
Butler County	16,480	16,100
Other fields	26,010	25,775
Total Kansas	182,175	178,675

North of Zenith

Stanolind Oil & Gas Co. No. 1 William Volker, SW NW NE section 23-24-11w, was drilling ahead below 3,700 feet. It is one-fourth mile north of the Zenith pool in Stafford County.

Another Stafford County well, Stanolind Oil & Gas Co. No. 1 G. A. Schilling, SW SW NE section 12-22-13w, was rigging up cable tools, preparatory to drilling into Arbuckle lime. It offsets the Fred Rust No. 1 Drach, Arbuckle discovery well.

Magnolia Petroleum Co. No. 1 Schammerhorn, CEL SW SW section 2-30-4w, was shut down after bailing down rotary mud. It is bottomed at 4,397 feet in Simpson sand, and was due to drill out cement plug. It is a west offset to the discovery well in the Anness pool of Sumner County.

Max Steinbuchel No. 1 Schaffer, SW SW NW section 18-25-1e, two miles west of the Goodrich pool in Sedgwick County, was dry and abandoned at 3,685 feet. Same operator's No. 1 Wickham, NE NE SW section 18-28-1e, south offset to the Oatville Wilcox sand discovery well, was drilling below 1,800 feet.

McPherson Wildcat

Carter Oil Co. No. 1 Hoglund, C W half NW SW section 8-17-3w, wildcat in McPherson County, near the town of Lindsborg, topped Viola lime at 3,352 feet, only drilling mud was recovered on drill stem test and it was drilling ahead at 3,430 feet.

Pryor & Lockhart No. 1 Bixby, NE NE SW section 24-19-3w, had Mississippi lime from 2,996 feet to 3,017 feet and oil rose 500 feet in the hole. It may be acidized. This well is a west offset to the recent south extensioner in the Chindberg pool, McPherson County.

New work starting in Kansas recently included the following:

In Barton County, Carter Oil Co. No. 1 Stueder, SE cor. section 10-17-11w, location; Stanolind Oil & Gas Co. No. 8 Kowalsky, SE SE NE section 11-20-11w, rig.

In Ellis County, Shell Petroleum Corp. No. 2 Rumsey, SW NW NW section 23-11-17w, rig; Witt and others No. 1 Hall, NW SW NE section 1-12-17w, location.

In Grant County, Panhandle Eastern Pipe Line Co. and others No. 1 well, C NW section 17-29-37w, rigging up rotary.

In Marion County, Lost Springs Oil Co. No. 8 Merillotte, SE SW NE NW section 23-17-4e, drilling below 550 feet.

Meade County Test

In Meade County, Bennett and others No. 1 Adams, SW SW NE section 22-34-30w, moving in material.

In McPherson County, E. B. Shawver No. 3 Klassen B, SW SE NW section 21-19-1w, cellar; same operator's No. 5 Lively, SE SW NW section 21-19-12w, spudded; H. & M. Drilling Co. No. 1 Elk, SW SW NE section 24-19-3w, rig.

In Reno County, Wilcox Oil & Gas Co. No. 3 Neufeldt A, SE SE NW section 12-23-4w, rig.

In Rice County, Hartman & Blair No. 2 Schartz, SW NW SE section 33-19-10w, drilling below 3,600 feet; Western Kansas Oil & Refining Co. No. 1 Bailey, SW SW NW section 19-20-6w, set 12½-inch casing at 125 feet; Shell Petroleum Corp. No. 1 Lantz, SW SE SW section 32-20-7w, location; Gulf Oil Corp. No. 3 Gossman, NW NW SE section 8-21-7w, rig.

In Russell County, Skelly Oil Co. No. 1 Collier, NE NE SE section 28-14-13w, moving in material; Wolf Creek Oil Co. No. 1 Rouback, SW SW NE section 15-14-15w, drilling below 400 feet.

In Stafford County, Stanolind Oil & Gas Co. No. 1 Mettscher, NE NE NW section 13-22-13w, rig; same company's No. 1 McComb, NE NE NW section 26-24-11w, rigging up rotary.

In Sumner County, Bradley & Lindsey No. 1 Duncan, NE SE SW section 15-35-2e, rig.

In Woodson County, Aikman and others No. 4 Massy, NE NW NE SE section 35-23-14, set 6-inch casing at 1,615 feet; Chris Sheedy No. 2 Corkey, NW NE NE NW section 20-25-14, machine.

Rice County

Potentials were taken at several Rice County wells. Continental Oil Co. No. 4 Groth, SW section 32-20-7w, Wherry pool, was bottomed at 3,328 feet in Conglomerate, and made potential of 2,978 bbls. of oil daily.

Gulf Oil Corp. No. 2 Stout, SE NE NE section 6-18-10w, Stumps area, at total depth of 3,022 feet in Lansing-Kansas City lime, made potential of 3,022 bbls. of oil daily.

Continental Oil Co. No. 2 Wood, SE section 12-18-8w, Geneseo district, was bottomed at 3,235 feet in Arbuckle lime, and made daily potential of 2,028 bbls. of oil.

Skelly Oil Co. No. 1-B Volkland, NW SW NW section 5-18-10w, Stumps sector, made daily potential of 3,986 bbls. of oil. Total depth was 3,006 feet in Lansing-Kansas City lime.

Russell County

Darby Petroleum Corp. No. 7 Michaelis, SW SE section 36-15-14w, Trapp pool, Russell County, was acidized and made potential of 1,243 bbls. of oil daily. It was bottomed at 3,319 feet in Arbuckle lime.

W. I. Southern, Inc. No. 3 Meharg, section 18-15-13w, Coralena pool, total depth 3,064 feet, was acidized and made potential of 675 bbls. of oil daily.

W. C. McBride, Inc. No. 1 Jillson, section 19-13-11w, Atherton pool, was acidized and made potential of 1,158 bbls. of oil at total depth of 3,200 feet.

Stanolind Oil & Gas Co. No. 1 Stumps, SW SW NE section 3-17-10w, Ellsworth County sector of the Bloomer field, set 7-inch casing at 3,273 feet, total depth 3,280

(Continued on Page 332)

Texas and Louisiana Gulf

By
NEIL WILLIAMS

McFADDEN BEACH PROSPECT YIELDS GOOD SIGNS OF OIL

HOUSTON, Tex., Dec. 27.—Shell Petroleum Corp. was running 9⅝-inch casing in No. 1 W. P. H. McFaddin, McFaddin Beach Prospect, Jefferson County, Texas, after a drill stem test of a second sand section showed pipe line oil. The testing tool was open for 10 minutes at 5,909-29 feet, and it recovered 1,200 feet of 33.4-gravity oil. The casing will be cemented on bottom and the hole carried deeper before a production test is made. This is the second drill stem test to show oil in commercial quantities. A previous test at 5,396-5,408 feet showed 450 feet of oil and 45 pounds of pressure. Several additional showings have been logged at intervals from 5,300 to 5,900 feet, but drill stem tests were not favorable. The well is on a large block held jointly with the Humble Oil & Refining Co., centering around the S. A. Pace Survey No. 2.

In the same county and located north at the Cheek area, Glenn H. McCarthy No. 1 J. E. Broussard continues to hold attention after two drill stem tests from 7,300-28 feet showed several hundred pounds of pressure along with some oil-cut mud and salt water. At the close of the week it was coring in shale below 7,350 feet. Location is in Lot 3, C. Hillebrand Survey.

Distillate production was apparently assured the Aldine area, Harris County, as a result of a drill stem test at Texas Gulf Producing Co. No. 1 J. W. Rath which showed 390 pounds of pressure and one and a half stands of distillate-cut mud. The test was made at 6,343-62 feet and before the testing tool could be closed the pressure built up to 500 pounds. The well is located east of several dry holes in the M. Sevey Survey.

Preparations are being made by Stanolind Oil & Gas Co. to test No. 1 Security Trust Co., located in the Katy area, Waller County. The hole is bottomed at 7,542 feet and casing will be cemented on bottom. Several sands showing gas are reported to have been logged and the well is expected to be a distillate well. This is the third test to be drilled by the company. Previous development has resulted in distillate production only.

Pickett Ridge Extended

A southwest extension of several hundred feet was indicated for the Kubela area of the Pickett Ridge field, Wharton County, with the showing of Great Plains Oil Co. No. 1 Bishkin and Meyers, I.&G.N. Survey No. 24. A drill stem test at 4,580-90 feet showed several feet of oily mud and 350 pounds of pressure. This is the same zone from which the first well is producing. It is coring for the 4,700-foot sand that produced in the Pickett Ridge field proper, about 1¼ miles to the southwest. In the same county, and located in the Withers field, a slight south extension was indicated by Texas Co. No. 4 Thompson which is preparing for a production test in the 5,500-foot sand.

The South Call area, Newton County, was given another set back with the abandonment of Republic Production Co. and Houston Oil Co. No. 2 Sabine Tram which quit at 7,380 feet. This well showed for a producer on a drill stem test at 7,105-23 feet, but showed salt water on a production test and was abandoned at its present depth after a Schlumberger survey was run. It is located 2,159 feet due west of and 933 feet south of No. 1 Peavy Moore Lumber Co. the discovery well. This is the second dry hole to be drilled as a recent dry hole was drilled southeast of the discovery well.

The first production test to be made at Sun Oil Co. No. 1 Bayshore Farms, Palacios field, Matagorda County, resulted in the well showing several thribbles of drilling mud cut with salt water and the hole is being plugged back for another test. The first test was made through perforations below 9,700 feet.

Locations for three wildcats were announced for the Onalaska area, Polk County, the San Jacinto Battle Ground area, Harris County and Tyler County. In Polk County, Schaeffer & Dyer and others No. 2 Jackson is located 660 feet east of No. 1, a dry hole and is scheduled to be drilled to the Sparta formation. In Harris County, W. S. Howell, Jr., has made location for a projected 4,000-foot test to be drilled on the W. B. Root and others 330-acre tract in the Arthur McCormick Survey. Actual drilling will probably start after the first of the year. One and one-quarter miles west of Warren, Tyler County, Navarro Oil Co. and Bunte Oil & Gas Co. has staked location for No. 1 W. M. Rice in the southwestern part of the county, being located in section 11 of the B.B.&C. Survey. It will probably be drilled to the Sparta formation which was found productive at the Spurger field in the same county and at Villa Platte in Evangeline Parish, Coastal Louisiana.

Distillate Producer

Merit Oil Co. No. 1 T. and M. Wright, Cedar Prospect, western Chambers County, has been completed for a distillate producer. Production is from the Marginulina formation through perforated casing at 6,390-92 feet. On a 24-hour gauge it flowed at the rate of 3 to 5 bbls. of distillate through a quarter-inch choke with tubing pressure 450 pounds and casing pressure 500 pounds. There was no salt water present. This well has been in process of completion for several weeks and has shown pipe line oil and salt water on several production tests below 6,400 feet. The new field is located in the Christian Smith Survey. Fuel from the well is expected to be used in drilling a second well in the near future.

Louisiana Coast

Along the Louisiana Coast, attention was centered on the Raceland area, Lafourche Parish, where Amerada Petroleum Corp. is preparing to make a production test at No. 1 South Coast Corp. Seven-inch casing was cemented at 10,301 feet, the total depth and the production test is scheduled to be made of the 10,000-foot horizon where sand showing oil was logged from 10,182 feet to 10,224 feet. The bottom 3 feet of the core at 10,219-24 feet showed salt water and the section was cored to 10,234 feet. This is the second sand section to have been found as a Schlumberger log showed 155 millivolts porosity and from 2 to 4 ohms resistivity at 7,283-76 feet. This is a geophysical prospect centering in section 34-15s-19e.

In the South Jennings field, Jefferson Davis Parish, Loffland Brothers No. 1 Fontenot, drilled cement to 8,655 feet and on a drill stem test through quarter-inch chokes top and bottom through perforations at 8,658-63 feet, it showed one joint of distillate-cut mud with no salt water and 500 pounds of pressure. Screen is expected to be set for a final completion test and the well is expected to be completed for a distillate producer although a previous test at 8,870-75 feet showed 20 stands of oil, 10 stands of oil-cut mud and three stands of salt water. The well is located south of the discovery well, a distillate producer in section 16-10s-3w.

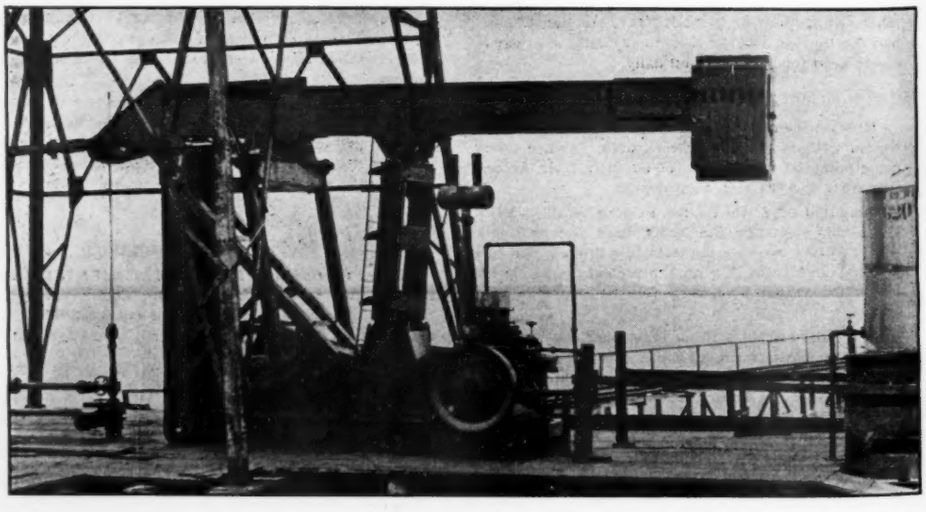
A second completion attempt at Union Sulphur Co. No. 1 Calcasieu National Bank, Jefferson Davis Parish, showed salt water through perforations from 8,292-95 feet, and a squeeze job was being made preparatory to plugging back and retesting approximately 4 feet higher in the section. This well has cored sand showing oil and gas at intervals from 8,022 to 8,425 feet, the total depth, and a producer of some description is expected. It is located several hundred feet of a dry hole in section 12-9s-6w.

Another producer was added to the west flank of the Jennings field, Acadia Parish, with the completion of Superior Oil Producing Co. No. 7 Leckelt, which was completed for an initial production of 550 bbls. per day. Production is from a screen setting in approximately 180 feet of oil sand bottomed at 7,202 feet. A production test was scheduled to be made on O'Meara Brothers No. 2 McFarlain which is running casing after coring a thick section of oil sand to a total depth of 7,049 feet. Location is in section 41.

Shallow Pay in Charenton

In the Charenton field, St. Mary Parish, Pan American Production Co. was rigging up pumping equipment at No. 1-B Eucer, which has uncovered a shallow sand. The well failed to flow from a sand section at 1,860-1,908 feet. This will be the first producer to be completed in this sand although several wells have logged the same horizon. The field has several

(Continued on Page 332)



Type of pumping equipment used on deep well in Calcasieu Lake, East Hackberry field

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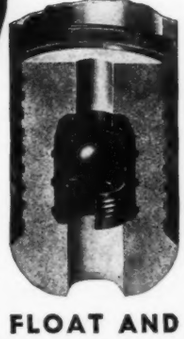

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Among Gulf Coast Drilling Contractors

Gulf Coast drilling contractors are to be congratulated in helping to make this year the most successful one in the history of the Gulf Coast district. As the year closes, a survey shows that this district has marked up a new record in the number of discoveries of which more than 50 per cent were brought in by various contractors for themselves or other operators. As the year draws to a close, a gradual decline in drilling operations has been noticed and the majority of the contractors are now marking time until the first of the year when appropriations and planned drilling programs of the various companies are completed. It is the general feeling among contractors that there will be no fast and furious drilling campaign as was the case during 1937, but rather a gradual increase from the present slump. That there is a slackening up in drilling in proven fields is reflected at the Hastings field in Brazoria County which during the past year has led all other fields in active operations. During this time from 20 to 25 rotaries have been active in Hastings, but it is reported that during the next few weeks, approximately 50 per cent of these will have been moved out.

Of the numerous discoveries, probably the most outstanding are located along the Louisiana Coast where 13 new pools have been opened and three more are expected to be added to the productive list before the end of the year. It is expected that new activity will be started in these fields shortly after the first of the year. However, practically all of these fields are controlled by one or two companies and are located in such isolated places and are producing from such great depths that development will be automatically curtailed and not more than one or two strings of tools are expected to be used at a time. Prospective fields include the Raceland area in Lafourche Parish where Amerada Petroleum Corp. has found a 10,000-foot sand in No. 1 South Coast Corp.; the Woodlawn Prospect in Jefferson Davis Parish, where Union Sulphur Co. is testing No. 1 Calcasieu National Bank, and No. 1 State Gulf of Mexico being drilled by Superior Oil Co. about a mile offshore from the Cameron Parish line which has encountered 70 feet of oil sand.

No decline in wildcatting is expected in 1938. It is probable that this phase of development will show an increase, as numerous prospects remain to be drilled, particularly that area along the coast line extending into the Gulf of Mexico from the Louisiana Coast, southwest to Cameron County in the Rio Grande Valley area. During the past several months, major companies and independents have leased several hundred thousand acres from the state and preliminary plans have been made by a few companies to start operations shortly after the first of the year, while others continue to work this area extensively with geophysical instruments.

Cron & Gracey report seven active operations, three in the Hastings field and one at Dickinson for Stanolind Oil & Gas Co.; one at Flour Bluff for Humble Oil & Refining Co.; one at Lake Long for the Fohs Oil Co. and one at Gibson for Shell Petroleum Corp.

George Echols has added another producer to his list by the completion of his No. 3 Landers, completed in the 6,000-foot sand in the north extension area of the Heyser field in Calhoun and Victoria counties. He is drilling No. 7 Bennett and has spudded in on a wildcat test 2½ miles northwest of the field.

Harry L. Edwards will wind up the year with five rotaries running as follows: One at Lockridge for McCurdy & Johnson; one at Hardin for Woodley Petroleum Co.; one at Dickinson for Ken-Ben Oil Co.; one at Hastings for Humble Oil & Refining Co. and one at Hockley for Stanolind Oil & Gas Co.

Nicklos Drilling Co. has spudded a second test at Villa Platte in Evangeline Parish, Coastal Louisiana, for the Continental Oil Co. The discovery proved to be one of the most interesting strikes along the coast during the year in as much as it is producing from an entirely new producing horizon for this district and future development here will be watched with interest. This discovery also set the stage for a trend play extending along the entire Conroe trend where much wildcatting is expected during 1938. Routine operations are carried on with four rotaries located at Tepetate, Valentine and at a wildcat in Jefferson Davis Parish for the Continental Oil Co. and Pan American Producing Co.

Rowan Drilling Co. has attracted much attention to the Lissie area, Wharton County, Texas, with the drilling of Strake Petroleum Corp. No. 1 O. R. Strunk. The hole is being reamed at a total depth below 6,000 feet and several possible sands are expected to have been logged, but this information has not been confirmed. It is a projected 8,500-foot hole. In the Louisiana sector, No. 5 Manhattan Fruit Co., Venice field, is expected to be spudded for Tide Water Associated Oil Co. during the week.

Smith & McDannald received new contracts from the Pure Oil Co. for two wells to be drilled in the Dickinson and Louise fields. This firm has several active operations, recently reported in a previous issue.

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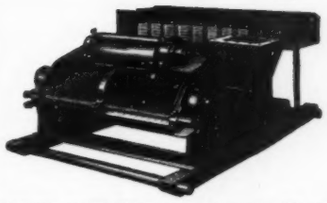

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Rocky Mountain Area

By
T. R. INGRAM

TEST IN WESTERN COLORADO LARGE HIGH-GRADE OIL WELL

DENVER, Colo., Dec. 27.—An important southeastern New Mexico wildcat location was announced the past week at Texas Co. No. 1 Corbin Permit, C NW SW section 10-18-33. It is 8 miles west and 1 mile south of the Vacuum area in Lea County.

Another new wildcat that will be closely watched is the Ohio Oil Co. No. 1 Saunders, C NE NW section 1-22-36. It is a location about 2 miles west of Hardy production in Lea County and 3 miles east of the Eunice area.

Ted Weiner and others No. 1 Parcell, C SW NE section 5-23-38, was location for a wildcat in eastern Lea County. It is 4 miles east of production in the Penrose sand pool and about 1 mile from the Gaines County, Texas, line.

Magnolia Petroleum Co. No. 3 State-Bridges, section 23-17-34, was drilling ahead below 3,190 feet in anhydrite and reported checking satisfactorily on formations. It is an outpost 1 mile south of the company's No. 2 State-Bridges, farthest southwest producer in the original Vacuum area.

Gulf Oil Corp. No. 1 LeMunyon, C NE NE section 28-23-37, Lea County wildcat, was to be acidized after swabbing dry, showing neither oil nor gas, at total depth of 3,651 feet. It is 2 miles northwest of the Mattix sand area.

Wildcat Near Hobbs

Eastland Oil Co. and others No. 1 Waldrop, C SE SE section 1-20-38, wildcat 5 miles southeast of the Hobbs field, was drilling in lime below 4,458 feet, with nothing reported showing in the last 650 feet. It had slight shows of gas and dead oil between 3,720-90 feet.

Cities Service Oil Co. No. 1-A Clossen, C NE NE section 18-22-36, wildcat 1 mile south and 1 mile west of South Eunice area, was bottomed at 3,814 feet in lime and was swabbing. It showed 6,000,000 feet of gas on drill-stem test from 3,717 to 3,748 feet.

Texas Co. No. 1 Welch, NE section 30-20-31, was location for a new wildcat in eastern Eddy County, southeast of the Getty pool, about 8 miles.

Several Eddy County wells were near completion. Nash & Windfohr No. 6-A Jackson, SE section 13-17-30. Jackson field, was acidized and produced 480 bbls. of oil in 24 hours at total depth of 3,525 feet, but was not reported as a completion.

Some Eddy Wells

W. A. Nichols and others No. 1 Johnson, NE section 35-16-31, was flowing at the rate of 200 bbls. of oil daily while cleaning out at 3,940 feet.

R. A. Shugart and others No. 1 Coulthard, C NW SW section 35-18-31, Eddy County wildcat, was reported swabbing 50 bbls. of oil daily while awaiting orders at 3,727 feet, total depth.

Etz Brothers No. 4 State, C S half SE SE section 16-17-30, Jackson area, was reported flowing 10 to 15 bbls. of oil daily while drilling below 2,980 feet.

Franklin Petroleum Co. No. 1 McIntyre, NE NW SW section 20-17-30, was reported flowing 415 bbls. of oil daily while drilling below 3,047 feet.

Grayburg Oil Co. No. 9 Burch, SW NE NE section 19-17-30, was bottomed at 3,158 feet, acidized and reported producing 25 bbls. of oil an hour, but had not been completed.

The holiday let-down in field activity was reflected in the small number of completions the past week, only six wells being completed in Lea County and no completions reported in Eddy County.

Completions of Week

Texas Co. No. 1 American National Life, C NE NW section 18-19-37, topped pay at 3,920 feet, was bottomed at 4,040 feet, treated with acid and flowed 145 bbls. of oil in five hours through choke.

Skelly Oil Co. No. 2 Mon-State, C NE SE section 13-19-36, pumped and flowed 299 bbls. of oil and 215 bbls. of water in 22 hours through tubing. Pay was topped at 4,050 feet, total depth 4,062 feet.

Repollo Oil Co. No. 1-B State, NE NE NW section 7-22-36, found pay at 3,780 feet, total depth 3,830 feet, and flowed 490 bbls. of oil in 12 hours through tubing.

Stanolind Oil & Gas Co. No. 1-B Hill, C SE NE section 6-21-37, flowed 72 bbls. of oil in 24 hours through choke after plugging back to 3,801 feet from 3,810 feet, total depth. Pay was topped at 3,648 feet.

Same company's No. 2-B Langlie, C NW NW section 15-25-37, found pay at 2,862 feet, total depth 3,458 feet, plugged back to 3,153 feet, and production was estimated at 20,000,000 feet of gas from 2,862-82 feet.

Skelly Oil Co. No. 1 Combest, NW NW SE section 27-23-36, between the Cooper pool and the Lynn area, found sulfur water at 3,944-50 feet, total depth; plugged back to 3,560 feet, perforated casing and acidized without result and was abandoned.

COLORADO

Western Colorado, to which special attention was directed the past summer with the starting of several important tests, sprang into the limelight the past week when the joint test of the Texas Co. and the California Co. in the SW SE NW section 35-3n-94w, on the Wilson Creek dome in Rio Blanco County, found heavy oil saturation in the Morrison formation. While coring to the Sundance is continuing cautiously and with frequent stops to test, the indications point strongly toward the making of a major discovery. A sand in the Morrison was topped at 6,644 feet and on December 17 and 18 coring continued to 6,704 feet. It stopped at that depth with the hole still bottomed in sand to make a test. It was tested for 45 minutes through the drill stem and showed for 50 to 60 bbls. per hour of green oil of 46.5 degrees gravity with no water, some gas and a little drilling mud. At that depth it was estimated to be 120 to 125 feet off of the Sundance, the principal objective, which is the producing horizon in the Iles and Moffat field 20 to 30 miles to the northeast in Moffat County. An additional 21 feet then was cored with showings of some gas and oil continuing and at 6,725 feet the core-barrel was being pulled. As soon as it is out of the hole the tester will be run again. H. A. Stewart, manager of the producing department of the Texas Co. for the Rocky Mountain area, who is in charge of the operation, says that it is planned to core on down into the Sundance and that the well possibly may not be completed until after the first of the year.

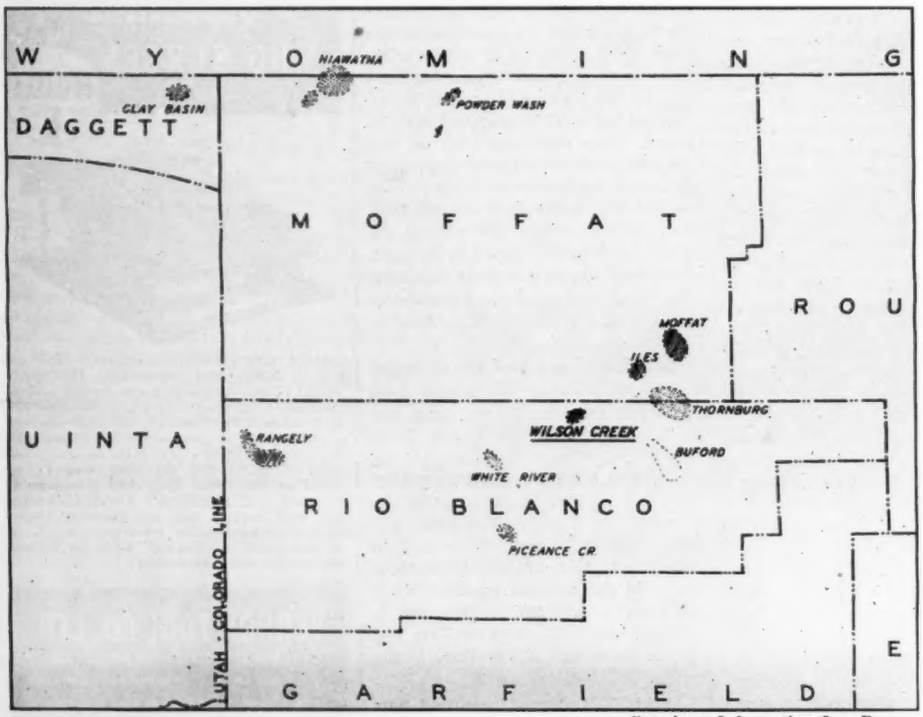
The Wilson Creek dome is a large structure with a closure of approximately 900 feet and 16,000 acres within the closing contour. All acreage within the structure is government land and controlled by the Texas Co. and the California Co. It is operated under a unit agreement.

The area in which the Wilson Creek well is located and extending 75 miles south into Pitkin County and west to the Colorado-Utah line came in for a wildcat play the past summer and several important tests are now drilling.

Archuleta County

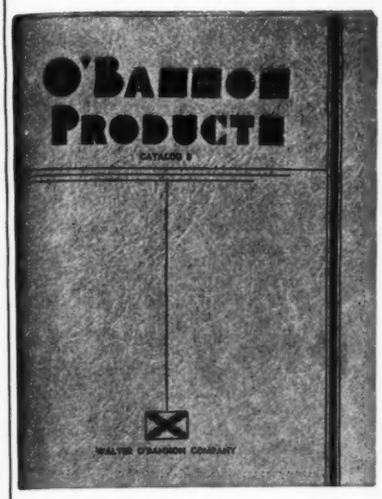
The Prospect Oil Syndicate's No. 2 Lena Garnett, NW SW NE Section 13-33n-2e, on the southwestern

(Continued on Page 328)



Petroleum Information, Inc., Denver

Wilson Creek dome in Rio Blanco County, northwestern Colorado, where the Texas Co. and California Co. joint test in section 35-3n-94w, found rich oil saturation in the Morrison formation. The test is being cored down to the Sundance. The well produced 50 to 60 bbls. an hour on a drill stem test in the Morrison formation



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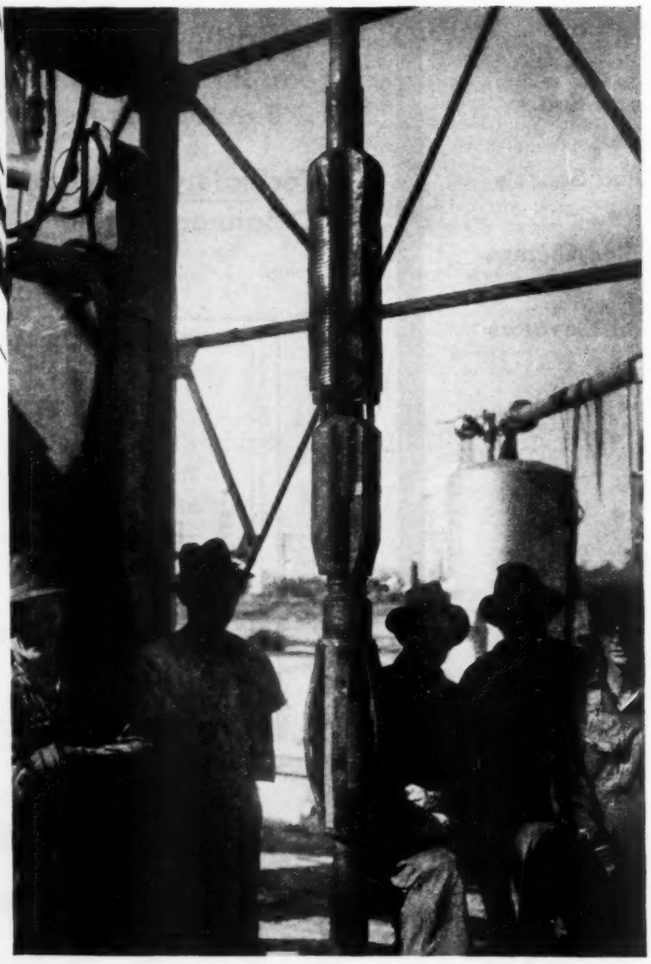

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North Louisiana, Arkansas

By
GEORGE WEBER

NEW CONSERVATION RULES FOR TWO ARKANSAS FIELDS

SHREVEPORT, La., Dec. 27.—In the year-end drilling slump now in effect in North Louisiana and Arkansas, developments of current or even potential importance were few in the past week. Many field operations and wildcats are shut down until after the first of the year, and new locations hit a low of eight, with an increase expected as new drilling schedules get under way next month.

One wildcat in North Louisiana showed promise of an important discovery, Oakes & Easton No. 1 Griggs in the southeast corner of Lincoln Parish, with 9 feet of sand indicated by an electrical log run this week.

Rulings on the Schuler field and Miller County Rodessa field announced by the Arkansas Board of Conservation effective January 1 attracted attention. In the Lisbon field of Claiborne and Lincoln parishes, North Louisiana, the Gulf Refining Co. posted the price of 98 cents for crude, meeting the previously announced cut of the Caddo Crude Oil Purchasing Corp.

Numerous wildcat tests were being watched with interest in the Farmerville, Shongaloo, Castor and Lisbon areas. Field operations in the most active areas declined, with the two extreme north and south extensions of the Rodessa field, Schuler, Lisbon and Cotton Valley, leading in number of drilling rigs.

Caddo Parish

A new gasser was brought in by A. O. Olson in the Blanchard field of Caddo Parish, as No. 1 Sharp, in the W half NW section 15-18-16, made an initial production test of 14,400,000 feet from a total depth of 5,624 feet. The test is about one-half mile east of the Union Production Co. No. 1-A Wheeler, which was completed several weeks ago for a distillate and gas producer opening the first Glen Rose production in the section.

RODESSA—TEXAS

With the main portion of Rodessa, in Caddo Parish, Louisiana, and Cass County, Texas, relatively quiet at present, the Marion County sector on the extreme south is receiving principal interest. Four new producers were brought in in the Cass and Marion counties area during the past week, three of which are in the latter county, in the Jefferson-Lodi sectors of the field.

W. C. Feazel No. 1 Parker, in the G. Crowder Survey, came in making 7 bbls. per hour on an 8-inch choke with tubing pressure of 220 pounds and casing pressure of 1,000 pounds. Total depth of the test is 6,090 feet.

Arkansas Fuel Oil Co. No. 2 Wade Houston in the Coy Survey, Marion County, made 545 bbls. per day on a quarter-inch choke with tubing pressure of 660 pounds and casing pressure of 850 pounds, total depth 6,094 feet.

Gulf Refining Co. No. 1 Grubaugh, Coy Survey, made 542 bbls. per day on a quarter-inch choke with tubing pressure of 660 pounds and casing pressure 1,000 pounds and total depth of 6,126 feet.

Gulf Refining Co. No. 1 Kemper, in the Bennington Survey, gauged 720 bbls. per day on a one-half inch choke with tubing pressure of 450 pounds and casing pressure of 700 pounds, total depth 6,085 feet.

The recent completions in the Marion County sector have shown low gas-oil ratios, averaging 400 to 450 feet per barrel of oil.

In the Marion County area, the interesting test, H. B. Turner and others No. 1 Scuddy, in the Ina Hanks Survey, and halfway between the Jefferson and Lodi areas, has cored saturated Henderson sand at 5,972-83 feet and saturated Gloyd sand at 5,994-6,006 feet. Seven-inch casing was set at 5,995 feet and tests to be made on the well over the week-end will be of primary interest to operators in the section.

RODESSA—LOUISIANA

Two new completions were made in the Caddo Parish, Louisiana, section of Rodessa during the week. Gulf Refining Co. No. 1 Allison, NW section 3-23-16, made 120 bbls. per day on a 21/64-inch choke with casing pressure of 400 pounds and total depth of 6,024 feet.

Shell Petroleum Corp. No. 1-A U. S. Government, SW SE section 9-23-16, was completed for an initial production of 117 bbls. per day on a one-half inch choke with tubing pressure of 575 pounds and casing pressure of 625 pounds at a total depth of 5,953 feet. The producer has a gas-oil ratio of 7,700 to 1, and operators will acidize.

RODESSA—ARKANSAS

The proration ruling set up by the Arkansas Board of Conservation limiting production in the Miller County section of Rodessa to approximately 10,000 bbls. daily will go into effect January 1, and a decline in the very active drilling campaign of the unregulated past few months is expected.

Following the voluntary proration of production to a maximum of 200 bbls. per well, adopted by the three pipe line companies serving the area, a fourth line was laid from the Roger Lacy lease to a loading rack on the Kansas City Southern Railroad nearby. Two tanks, providing 47,000 bbls. of storage are in the erection stage at the terminal of the new line, and runs through the line, which is as yet connected to but one well, are reported to be 700 to 800 bbls. per day. No crude has yet been moved from the terminal by tankcar.

Production in the Miller County field has continuously declined in the past several weeks, due to the decreased purchases of the pipe line companies, and the inability of many of the wells to hold up the high production with which they originally flowed. The total daily production in the section will not greatly exceed the state allowable by the end of this month.

In Miller County, one new producer was brought in during the week. Roger Lacy No. 1 Sartor, SE W half section 15-20-28, made 60 bbls. per hour on a 1-inch choke with tubing pressure of 50 pounds and casing pressure of 700 pounds. Total depth is 6,040 feet.

W. M. McVey, Kilgore, vice chairman, East Texas chapter, A.P.I. Division of Production; and L. G. Hughes, Shreveport, La., assistant manager of production, Louisiana-Arkansas-East Texas division, Texas Co.

Estimated Daily Production

Estimated daily gross production all companies week ending December 24, 1937:

NORTH LOUISIANA

Bellevue	775 bbls.
Caddo Light	3,820
Caddo Heavy	2,640
Converse	635
Cotton Valley Heavy	310
Cotton Valley Light	3,565*
De Soto and Red River	1,425
Elm Grove	390
Haynesville	3,060
Holly	100
Homer	2,460
Lisbon	13,240
Pleasant Hill	125
Rodessa	44,200
Sarepta-Carterville	310
Sligo	375
Sugar Creek	345
Urania	2,865
Zwolle	870
Total:	81,510

SOUTH ARKANSAS

Buckner	380
Champagnolle	1,280
El Dorado	1,880
Lisbon	280
Miller County	410
Nevada	720
Rodessa	9,740
Schuler	9,275
Smackover Light	2,000
Smackover Heavy	16,400
Stephens	560
Troy	1,150
Urbana	1,200
Total:	45,275

Texas side of Rodessa field 18,475 bbls. daily
*3,080 bbls. is distillate.

Bienville Parish

In southwestern Bienville Parish, the Gulf Refining Co. No. 1 Goodpine, section 25-14-8, a wildcat test, is coring shale below 6,610 feet.

Lisbon Field

Although no completions were reported for the Lisbon field of Claiborne and Lincoln parishes, an important edge well, Sloan & Zook No. 5 Patton cored one of the best "sections" in the field to date. The test, located in section 1-20-5, has saturated lime at 5,304-21 feet and has set 5-inch casing at the total depth of 5,371 feet, for completion early next week.

The H. W. Patton Estate No. 5 is two locations west of the M. S. Patton No. 1, which two weeks ago came in making 1,920 bbls. per day after acidizing, and operators report that production is continuing without any indication of the pressure decrease which often occurs in Lisbon wells after several days' production. The new well is two locations west and south of the nearest production in the field, and will constitute an important extension when completed.

Lisbon drilling operations, which have dropped off considerably during the past six months from the boom proportions of last spring, may decline still further, due to the price cut lately placed in effect in the field by two companies. The new pipe line planned to the field by Barbour & Woods of Houston is expected to be in operation within two months, as survey work has begun on the right of way and a site for the pump station and storage in the field is being selected. The new purchaser announces that the former price of $1.10 will be paid for crude up to a maximum of 7,500 bbls. per day. Lisbon operators have, for the past several weeks been forced to operate leases at production figures considerably below allowable due to decreased takings by the two purchasers in the field.

In the Sugar Creek area, southwest of Lisbon, the Union Production Co. and Standard Oil Co. of Louisiana No. 2 Brownfield, in section 5-19-5, an important test, cored lime, sand and shale at 8,300-08 feet which showed

a very slight odor of gas. The total depth of the test is 8,308 feet.

On the southwestern edge of the Bull Bayou field in De Soto Parish, the Petroleum Heat & Power Co. No. 1 Kavanaugh, NE cor. NW SW section 7-11-11, is reported to have cored oil sand at 2,834-40 feet. Seven-inch casing has been set at 2,830 feet and the total depth is 2,845 feet.

North Louisiana Wildcats

In Lincoln Parish, an important wildcat, Oakes & Easton No. 1 Griggs, section 36-18-1w, cored the top of the Travis Peak at 5,975 feet last week. With hole bottomed at 6,259 feet this week, a Schlumberger log showed good porosity and resistivity at 5,931-40 feet. Operators have set 5½-inch casing at total depth and will perforate and test the section sometime before the first of the year. The wildcat is located in the southeastern corner of Lincoln Parish, nearly 30 miles southeast of the Lisbon field, which was brought in one year ago by the same operators.

In Union Parish, Joe Modisett No. 1 Frost Lumber Co., wildcat, in section 14-21-1e, is drilling shale at 6,968 feet. This test is considered to be one of the most important now being drilled, located in the Farmersville area.

The Shongaloo gas area of Webster Parish also has an important deep wildcat test under way, the Magnolia Petroleum Co. No. 1 Sexton Unit, located in the SW cor. NW SE section 32-23-9. At latest reports the well was drilling below 2,627 feet.

Schuler Field

In Arkansas the Schuler field of Union County was enlarged by completion of two producers in the Jones sand of the Lower Marine. Although reports of official gauges on neither has been received, they are producing, bringing the total number of wells in the recently discovered sand to six. A large number of additional tests are making hole in the field with the Jones sand as the prospective pay, and others are set on the sand for early tests.

The Arkansas Board of Conservation announced rules for the Schuler field, which will be placed in effect January 1. The field will be developed on a 20-acre spacing rule, and the top allowable for wells in the Jones sand was set at 400 bbls. per day.

Simultaneously, the board announced that the same 20-acre spacing rule will be enforced in the Miller County section of Rodessa, and the top allowable for wells in that area will average 200 bbls. per day. Allowables in both fields will be determined 50 per cent on bottom-hole pressure and 50 per cent on acreage, with a cut-back provision for gas-oil ratio.

In a hearing on the newly opened Buckner pool of Columbia County, the Standard Oil Co. of Louisiana, which opened the field with No. 1 McKean and holds a majority of the acreage in the area, has asked for a 40-acre spacing rule. The board's decision has not yet been announced.

Rocky Mountain Areas

(Continued from Page 324)

edge of Gramps No. 1 Pool, Archuleta County, was abandoned at 1,535 feet in the Mancos shale. Formations were found to be dipping 49 degrees. It limits the Gramps production on the southwest. Lafayette-M. Hughes' No. 14 Gramps limited the production on the northwest earlier in the year.

Garfield County

The Roaring Fork Oil Co. No. 1 Patterson, on the Roaring Fork Structure, had a show of gas with some free oil at 721 feet which continued to bottom at 735 feet. The 8¼-inch was cemented at 726 feet to dry up the hole and test the gas, which the driller estimates at not less than 1,500,000 feet per day. Upon results of test will depend whether it will be completed as a gas well and another hole started, or go on down. The bottom is still above the Madison lime and the sandstones which show in the Pennsylvanian section in that region.

WYOMING

Albany County

The Murphy Oil Co. No. 2 Holst-Woolf, NE NW NW section 19-17n-76w, Quealy dome, was plugged and abandoned at 3,650 feet. It is an outside well on the southeast and limits the productive area in that direction. It was an east offset to No. 1 Holst-Woolf, which is a small pumper in the Dakota at 3,582-3,690 feet, but which had water in the Sundance at 3,955-70 feet.

Carbon County

The Ohio Oil Co. No. 2 Union Pacific, on the Simpson Ridge dome, ran into steeply dipping beds at 4,534 feet and plugged back to 765 feet where it will set a whipstock and deflect the hole in hopes of penetrating the dipping section and drilling into the more horizontal beds.

The Italo Petroleum Corp. is rigging up to drill a test on the Shirley dome, on acreage held by Gene Tunney and associates.

Niobrara County

The Minnelusa Oil Co. No. 1-A Lamb, CWL SE SW section 27-36n-65w, which extended the Minnelusa productive area half a mile to the north in the Lance Creek field, is listed as a completion for 450 bbls. per day from the Minnelusa at 5,448-69 feet. Elevation 4,410 feet.

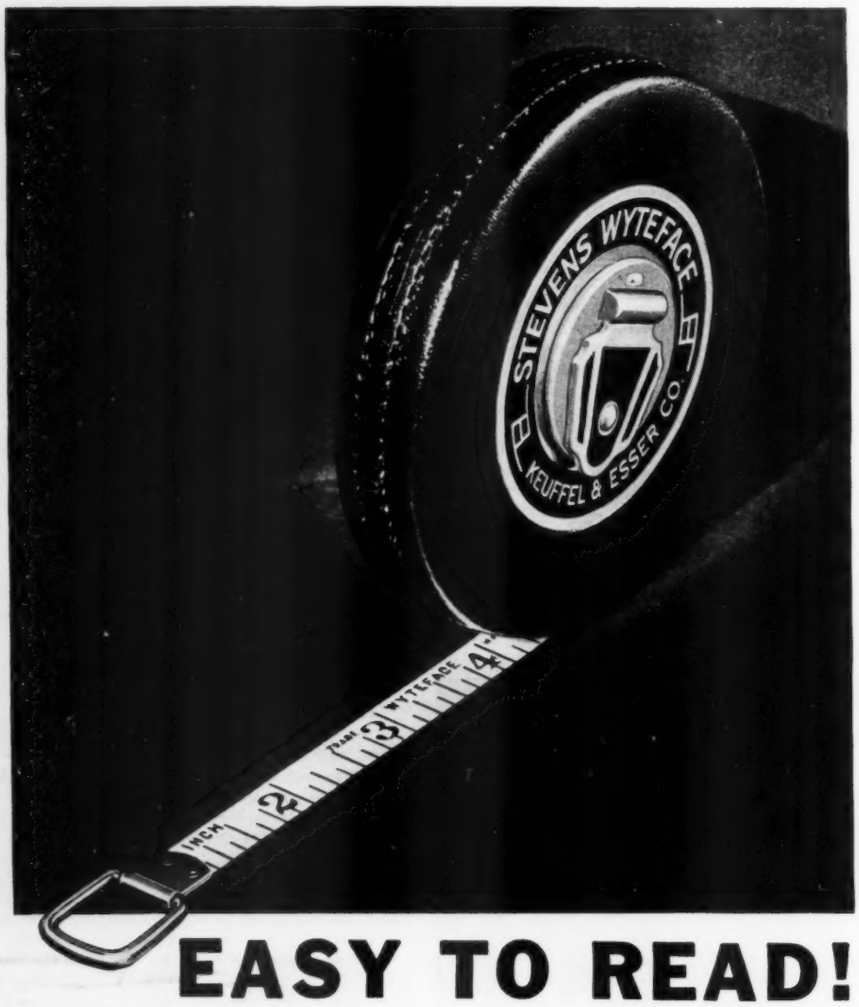
The Continental Oil Co. No. 8 Otto Rohlff, SE SW SE section 31-36n-65w, on the northwest side, which was reported making 129 bbls. in 24 hours from the Minnelusa at 5,242 feet, total depth, through a three-sixteenth-inch bean, is acidizing with 1,000 and 2,000 gallons. It looks as if it will make a better well than first indicated.

The MacKinnie Oil & Drilling Co. No. 2 Thompson, an offset to the Holly-Cobb No. 2 Novick, on the southwestern side of the field, looks like it will make a large well. It had saturated cores in the Minnelusa at 5,270-78 feet and stopped to set the 7-inch at 5,271 feet. Plug will be drilled next week. It is about 217 feet higher on the sand than the Ohio Oil Co. No. 5 Leo on the east side.

MONTANA

Toole County

Only three drilling wells are active in the Kevin-Sunburst area, Toole County, Montana. One well was completed in the Big West Oil Co. No. 7 McDonald, NW NE NE section 19-35n-2w, which is pumping 4 bbls. per day from the contact at 1,585-1,617 feet, after acidizing.



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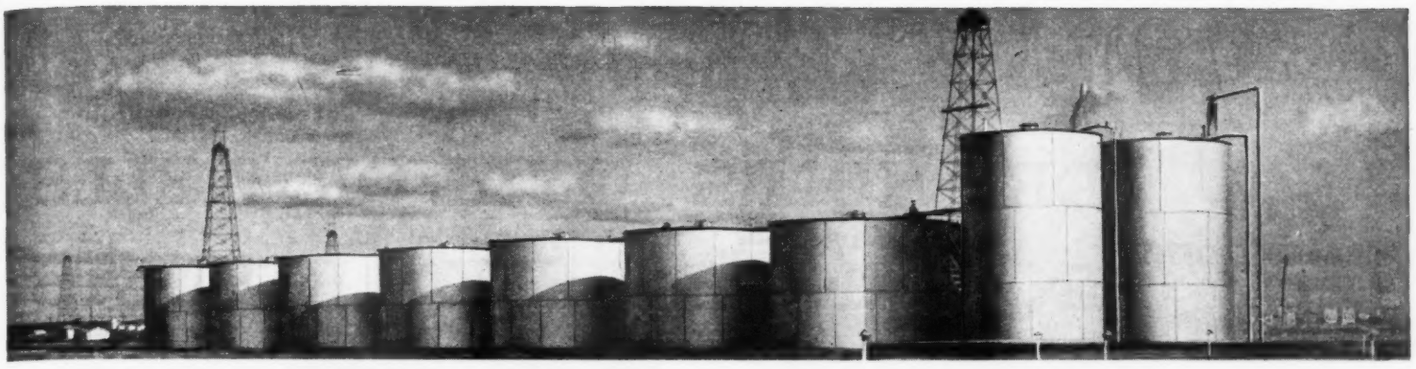

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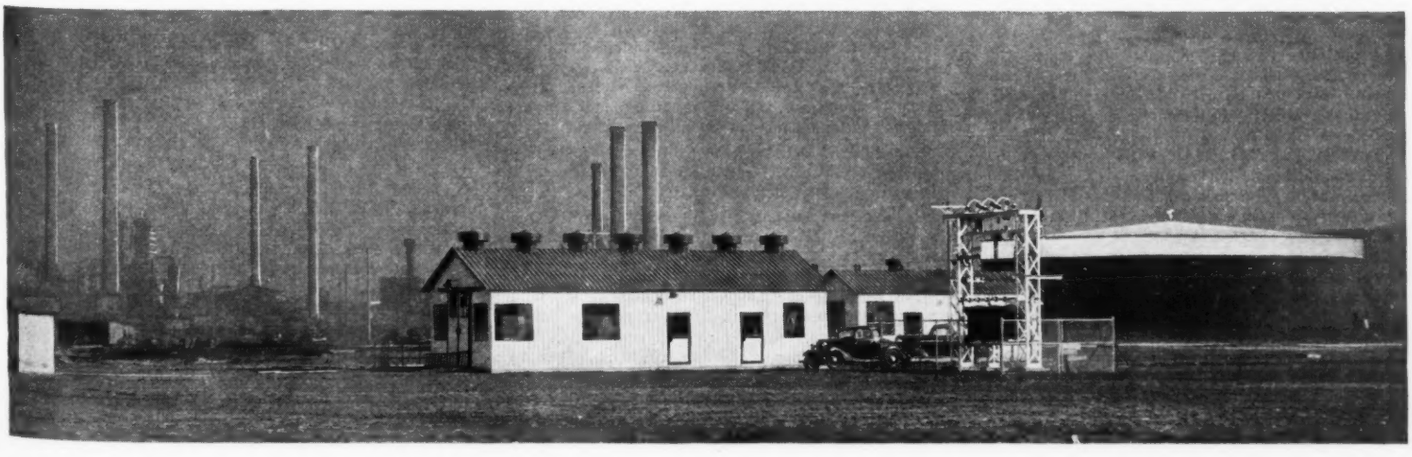

Central West

By STAFF CORRESPONDENT

DRY HOLES EQUAL OIL WELLS IN ILLINOIS WEEK'S RESULTS

MATTOON, Ill., Dec. 27.—Eight oil wells with a combined initial production of 2,006 bbls., and eight dry holes in Fayette, Clark, Christian, Marion, Wayne, and Richland counties, summed up the week's results in the Illinois fields in the past week. Nine new operations were reported. It was the first week since the Central Illinois fields were opened that the new work did not exceed the completions.

A number of near completions were recorded. In Clay County, Pure Oil Co. No. 1 A. L. Moseley, SW NE NE section 33-3n-8e, was shot with 30 quarts and responded with a 10-bbl. production. It was acidized with 1,000 gallons and then with 2,500 gallons, and swabbed 45 bbls. net oil in 24 hours. The casing was being perforated at 2,876-2,903 feet for another test. In Richland County, Mammoth Producing and Refining Co. No. 1 McCauley, SW SE SW section 28-3n-9e pumped 60 bbls. in a 24-hour test, but was not yet completed. W. B. Frost No. 1 Farris, SW SW SE section 18-3n-10e had pay at 3,064 feet and the hole filled with oil. It made a 50 bbl. flow and then swabbed and flowed 50 bbls. and quit. Carter Oil Co. No. 5 Watkins, SE SE SE section 33-4n-9e, with pay at 2,974-80 feet, was acidized with 1,000 and next with 3,000 gallons. It flowed 77 bbls. oil in 6 hours and then quit. In Fayette County Carter Oil Co. No. 1 Clow, C E half SW NE section 15-8n-3e, had a tight saturated sand at 1,499-1,503 feet and set 7-inch casing on top of the sand believed to be the Bethel. In the same county Carter Oil Co. No. 1 Mary Miller in section 12-8n-3e pumped 5 bbls. of oil in 6 hours and pumped off. The company has been working on this well for two weeks. In Jasper County Denver Producing & Refining Co. No. 1 Ochs, NW NW NE section 33-6n-14w, measuring from Indiana principal meridian, had Ste. Genevieve limestone at 2,654 feet, and a showing of oil at 2,695-2,703 feet. A drill stem test developed 50 feet of mud and a small oil showing. In Jefferson County Carter Oil Co. No. 1 Tate, C W half NW NE section 10-1s-2e, drilled to 3,874 feet and was plugged back to 1,990 feet. Benoist sand at 1,982 feet yielded 125 bbls. in 15 hours on the swab. The hole filled 50 feet per hour thereafter and is regarded as a 50-bbl. pumper at least. In Clay County C. H. & C. Oil Co. No. 1 Duff and others SW NW NE section 7-3n-8e was drilled to 3,073 feet and was plugged back to 3,021 feet and the casing perforated with 118 holes.

In Marion County, Adams Oil & Gas Co. No. 17 Merryman, SW cor. SE SW section 21-4n-1e, pay at 1,392-1,442 feet, pumped 69 bbls. initially. Same company's No. 16 Merryman, NW cor. section 28-4n-1e, is a 55-bbl. completion at 1,396-1,428 feet. Frank Frederick No. 1 Nattier, SE cor. NE SW section 28-4n-1e, is a 37-bbl. pumper at 1,440-57 feet. Kirk Holland No. 1 Jennings, SW cor. SE SW SW section 28-4n-1e, had salt water at 1,457-60 feet, and was abandoned.

In Fayette County, Hausman and others No. 1 Northwestern Insurance Co., SE cor. NE SW section 22-6n-1e, was dry and abandoned at 1,733 feet. It topped Ste. Genevieve limestone at 1,610 feet and Fredonia at 1,695 feet.

In Clark County, National Consumers Oil Co. abandoned No. 1 Minnie Jackson after trying to make a producer of it at various depths. The total depth is 3,122 feet. The company may drill it deeper next spring. It has shown some oil.

In Christian County, Rogers Bros. and others No. 1 Johnston, NE SE SE section 27-12n-2w, was dry and abandoned at 3,112 feet. Trenton limestone was topped at 3,112 feet.

In Clay County, Graham & Duncan No. 1 Land Bank, NE SE NE section 8-2n-8e, an old completion deepened from 2,994 feet to 3,024 feet and acidized with 3,000 gallons, did not increase its production. It pumped 150 bbls. of oil in 24 hours.

In Wayne County, Pure Oil Co. No. 1 Anna Gill, SW SW NE section 27-2n-8e, had pay at intervals from 3,052 feet to 3,072 feet. It was acidized with 3,000 gallons and flowed and swabbed 300 bbls. of net oil in 24 hours. Pure Oil Co. No. 2 Anna Gill, C E half SW NE section 27-2n-8e, had salt water at 3,063-82 feet and was abandoned.

In Richland County, Pure Oil Co. No. 2 Anna Snyder, C W half SW NW section 3-3n-9e, swabbed and flowed 195 bbls. a day from pay at 2,961-71 feet and was completed. Pure Oil Co. No. 2 J. O. Coen, C W half SW SW section 4-3n-9e, had pay at 2,930-43 feet and swabbed and flowed 297 bbls. in 24 hours. Pure Oil Co. No. 2 C. L. Wilson, C E half NE NE section 8-3n-9e, found pay at 2,935-48 feet and flowed 903 bbls. in 24 hours. The completion credited last week to Max Pray No. 1 Minnie Baker, a 130-bbl. well, should have been credited to A. P. Muhlback, he having bought the lease before the well came in. Pure Oil Co. No. 3 J. O. Coen, C W half NW NW section 9-3n-9e, had sand at 2,933-47 feet. The well flowed 316 bbls. initially. Kingwood Oil Co. and McMahon No. 1 Negley, NW NW SE section 31-5n-9e, was dry and abandoned at 3,194 feet, in hard lime. Hollingsworth Oil & Gas Co. No. 1 Waggoner, NE NW NW section 5-3n-14w, was dry and abandoned at 3,245 feet.

In Lawrence County, Strauss and others No. 1 Robeson, NW SE SE section 16-3n-10w, measuring from Indiana Central Meridian, was abandoned. Drill stem was twisted off at a total depth of 3,073 feet.

New Operations

First reports of new work included the following operations:

In Washington County, Silvers and others No. 1 Paul, NW NW SE section 29-3s-5w, spudded and shut down.

In Richland County, Pure Oil Co. No. 1 Montgomery, C E half NW SE section 8-3n-9e, location. Max Pray No. 1 J. R. King, SW SW SE section 21-3n-9e, derrick up; Papoose Oil Co. No. 1 Lynch, NE NW NE section 5-3n-10e, location.

In Marion County, Kirk D. Holland, No. 1 Sadie Nottier, SW cor. NE NE SW section 28-4n-1e, drilling at 103 feet; Holland's No. 1 Mike Rogier, SE cor. NW NE SW section 28-4n-1e, shut down at 625 feet.

In Effingham County, S. Hollis No. 1 Haarmann, C NW SE SW section 32-8n-6e, rigging up rotary.

In Cumberland County, C. Kapschull No. 1 Oakley, C W half NE SW section 34-10n-8e, rotary tools in. (Location subject to correction).

OHIO

FINDLAY, Ohio, Dec. 27.—The only bright spot in the central Ohio area during the past week was the Gas Producing Co. No. 3 Emma Fleming, NW quarter section 18, Clayton Township, Perry County. It flowed 100 bbls. of oil the first 24 hours and made around 600,000 feet of gas. Six gas wells and four dry holes make up the balance of completions.

In Ashland County, Lake Township, Robinson and others No. 2 W. A. Moser, section 8, was dry in the Berea at 685-97 feet.

In Guernsey County, Washington Township, Jones & Jewell No. 1 Mahlon Combs, section 14, found the Berea dry at 1,253-1,325 feet; total depth 1,335 feet; abandoned.

In Knox County, Monroe Township, H. E. Perkins No. 1 Isabel Barnard, section 17, was dry in the Clinton sand at 2,536-46 feet.

In Monroe County, Benton Township, Jims Run Oil & Gas Co. No. 1 James G. Daily, section 5, is good for 178,000 feet of gas per day from Keener sand at 1,440-85 feet.

In Morgan County, Deerfield Township, Portage Producing Co. No. 3 Howard White, section 17, found the Clinton sand broken and dry at 4,068-90 feet.

In Muskingum County, Washington Township, Wittmer Co. No. 1 Howard H. Bowden, Lot 8, fourth quarter, made 200,000 feet of gas from Clinton sand at 3,852-77 feet.

In Summit County, Green Township, East Ohio Gas Co. No. 1 Metzgar Hartong, section 34, was good for 684,000 feet of gas from the Clinton sand at 4,304-20 feet.

In Tuscarawas County, Franklin Township, East Ohio Gas Co. No. 2 H. B. Fuhrer, Lot 11, first quarter, made 300,000 feet of gas from the Red Clinton sand at 4,265-99 feet.

In Vinton County, Clinton Township, Kelch Bros. No. 4 E. O. Hutt, SW quarter section 18, made 70,000 feet of gas from the Hamden sand at 728-52 feet.

EASTERN KENTUCKY

ASHLAND, Ky., Dec. 27.—Pre-Christmas reports show considerably lighter operations in the Eastern Kentucky field this week with one small oil well and one gas well being completed. Unfavorable weather, working conditions and the rather muddy roads in certain sections of the area have also tended to cut down the reports from various field men.

The Kentucky-West Virginia Gas Co. reports the completion of well No. 5,229 on the John W. Woods land on Porter Branch in Floyd County. The well was completed at a total depth of 2,652 feet in White Slate and shows a daily flow of 328,000 feet of gas per day.

Mrs. Agatha Wireman, operator, completed No. 23 on the J. M. Townsend land on South Fork in the district of South Fork in Powell County. The drilling halted at the 750-foot mark and the well has a daily production of 5 bbls. of oil.

WESTERN KENTUCKY

OWENSBORO, Ky., Dec. 27.—Two oil wells, three gassers and four dry holes, a total of 9 completions comprised the Christmas week crop in the Western Kentucky fields. What may develop into a discovery of importance was reported from Pickette County, Tenn., where Robinson Oil Co. No. 1 Phillips, 1½ miles south of the Kentucky state line and 2 miles west of the Pickett County line found St. Peters Sand (the Wilcox sand of Oklahoma) at 1,394-1,402 feet, total depth and filled up 600 feet with oil.

Completions of the week in Western Kentucky were as follows:

Breckenridge County

Vanzant district: Bryan & Patton No. 1 Grace Patton, 150,000 feet of gas, 90 pounds rock pressure, Bethel sand 329-374 feet.

Easton district: J. C. Ellis No. 12 Odie Richards, completed as key well in Jett sand.

McLean County

Island district: Marhill Oil & Gas Co. No. 1 Everett Wood, dry hole, total depth 1,502 feet; drilled to 17 feet in Little lime.

Knobs district: Kentucky Natural Gas Co. No. 1 E. Nall, 100,000 feet of of gas and small amount of water in upper Stray sand; plugging.

Ohio County

Narrows district: Nollem Oil & Gas Co. No. 1 J. H. Coppage, dry hole, total depth. 640 feet. Barlow sand 606-610 feet; Bethel sand 627-640 feet, water.

Pellville district: A. Teller and others No. 1 Alonzo

(Continued on Page 332)

2 MAJOR WORTHINGTON DEVELOPMENTS

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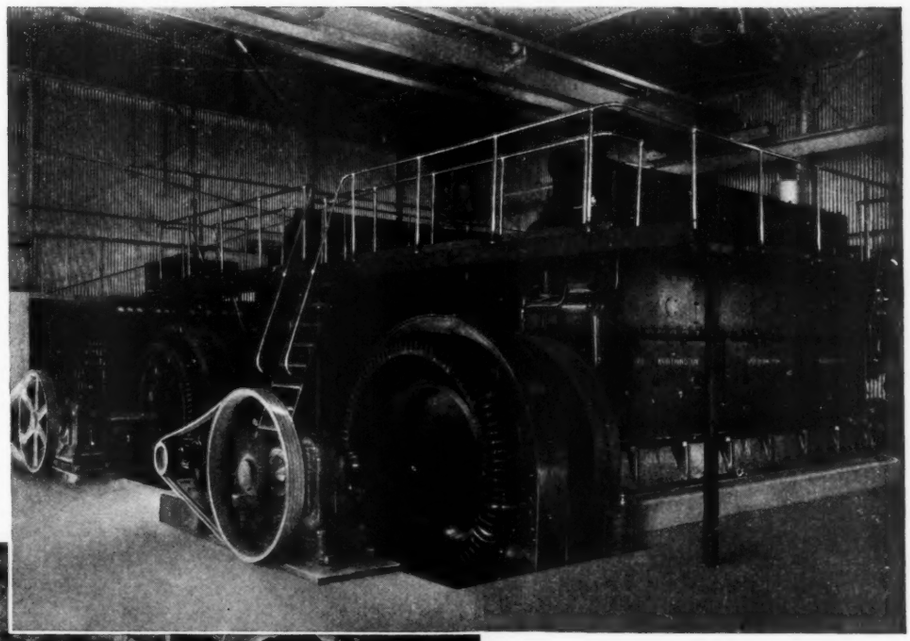

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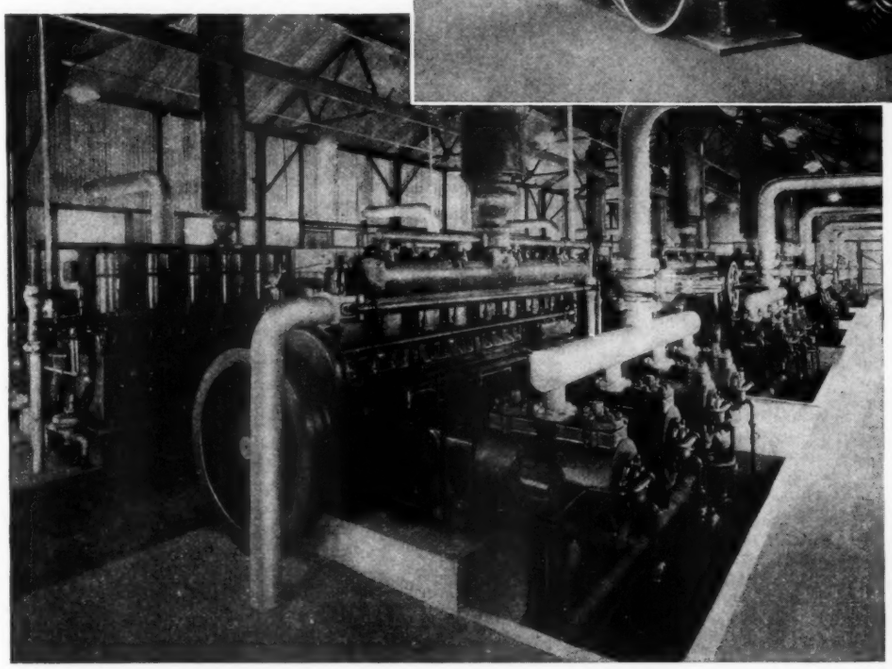

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WORTHINGTON

Michigan Field Report

BUCKEYE COMPLETIONS ADD 4,100 BARRELS TO POTENTIAL

By O. C. PRESSPRICH

SAGINAW, Mich., Dec. 27.—Shifting scenes of activity in Gladwin County focused attention on the Secord Township—18n-1e oil field, where an important test by Archie M. Henry was progressing into the Dundee to bring the second exploration in the area near pay sand. Reports varied as to formation depths, although seasoned operators reached the point of declaring the well—according to all indications—would be successful. The test is Henry's No. 1-A State, SW NE NW Section 12, and would be important from the standpoint of confirming the first test in Secord at Whitehill, Clovis & Drury's No. 1 Bosley, NE SE SE Section 11.

While the second Secord test was being closely watched, Bentley Township, also in Gladwin County, was given some attention to add to confirmation of a possible Bentley field when McClanahan Oil Co. No. 1 Connolly, NW NW SW Section 35-17n-2e, came in with approximately 100 bbls. of oil daily after a 1,000-gallon acid shot. The McClanahan well definitely establishes a new section of the Bentley district as a possible favorable production source.

North Buckeye

Four of the eight producers added to the North Buckeye pool the past week were developed by Sun Oil Co., which has had most of the new producers in the north field in recent weeks. Sun's prolific Rabb, Strohkirch and Card leases are adding producers weekly. Sun Oil Co. No. 4 Card, NW SE NW Section 10-18n-1w, had a production of 700 bbls. after acid; No. 5 Strohkirch, SE NW NW Section 10-18n-1w, 500 bbls. daily after acid; No. 3 Strohkirch, NW NE NW Section 10-18n-1w, 400 bbls. after acid; No. 4 Strohkirch, SW NE NW Section 10-18n-1w, 300 bbls. after acid. Rowmor Corporation its No. 2 Manyet, SE NW SE Section 3-18n-1w, is a 200-bbl. producer after acid, increasing the production of the far north and northwest extension of the north pool. Socony-Vacuum Oil Co. No. 6 Dailey, SE SW NE Section 12-18n-1w, added 175 bbls. daily after acid and C. W. Teater's No. 6 Domokos, SE NW NW Section 11-18n-1w, developed 75 bbls. natural production and is swabbing preparatory to acid treatment. Mammoth Producing & Refining Co. also planned to acidize its No. 4-C State, SW SE SE Section 10, which came in at 150 bbls. natural flow.

South Buckeye

Production in the south (Oard) pool was dominated by the Voorhees Drilling Co., which figured in all the producers brought in during the week in the area. All of the new wells—two being natural and one acidized—are in Section 26. Voorhees Co. No. D-2 Fritzwater, NE NE NE Section 26-18n-1w, and its No. 3 Buehler, NE NW NE Section 26, each developed 300 bbl. daily natural production, and its No. 1 Buehler, SE SW NE Section 26, was acidized to step up output threefold to 600 bbls. daily. Beaver Trust's No. 4 Woodring, SW SE SE Section 23-18n-1w, a midway field producer, was acidized, giving it an output of 400 bbls. daily.

Activities in both Buckeye fields apparently were not greatly influenced by Christmas week, although most operations suspended for the holiday itself. Winter weather conditions influenced operations to a greater extent, with many interior locations handicapped by snowbound roads.

Gratiot County—Newark Township

Continued hopes for a Gratiot County oil producer ran high this past week as Bliss Trustee & Red-Man Oil Co. No. 1 Martin Estate, SW SW NW Section 26-10n-3w, reported passing a gas show of between 2,000,000 and 3,000,000 feet in the Michigan stray sand. Drilling continued toward the Dundee in the hope of hitting the first Gratiot County oil well, tests for which have produced nothing but dry holes to date. In North Shade Township of Gratiot County (9n-4w) another failure rewarded efforts to find the elusive pool when Chartiers Oil Co. No. 1 Bolyard, SW SW NE Section 12, was plugged and abandoned at 3,185 feet. The Bolyard well is located eight miles southeast of the lower Crystal field of Montcalm County.

Gladwin County—Hay Township

Hay Township prepared to creep back into the Gladwin County oil picture with two tests ready to be brought in during holiday week. J. V. Wicklund Development Co. No. 1 Kimble, SW NE SW Section 16-18n-1e, was swabbing after acid treatment, with indications favorable that another producer would be added to Hay Township, situated northeast of the North Buckeye pool. Petroleum Investors, Inc's. No. 2 Knight, SW NW SW Section 16, is being completed.

Isabella County—Sherman Township

Pure Oil Co. added two producers to its string last week. The No. 1 Cornell, SE NE NW Section 33-15n-6w, increased its natural flow from 124 bbls. to 420 bbls. daily by acid, and the No. 6 Latham, NE NW SE Section 33-15n-6w, was completed with a natural flow of 315 bbls. daily.

Midland County—Edenville Township

Failure loomed for Sun Oil Co. No. B-1 State, C N half SE NE Section 5-16n-1w, which was deepened after an unsuccessful acid shot. Operators expected to issue plugging orders for the test, which was looked to as opening a possible Edenville Township pool. While indications apparently were favorable, its rating commercially appeared doubtful.

Midland County—Porter Township

What appeared to rate as a very small producer after an acid shot was Pure Oil Co. No. A-12 Bond, C S half NW SW Section 7-13n-1w, with no gauge given. Future of the well was in doubt.

Montcalm County—Crystal Township

Jetter Drilling Co. No. 1 Loucks, NW SE SW Section 12-10n-5w, was testing this week at 3,187 feet after acidizing a small show of oil in the Dundee.

Clare County—Hamilton Township

Sun Oil Co. No. 1 Weldon, NE NE SE, Section 14, was reported drilling ahead of 3,000 feet with indications favorable. In Lincoln Township (18n-5w) McClanahan Oil Co. No. 1 Mortenson, C SW Section 9, was abandoned at 1,668 feet after finding formations running low. It is the second Lincoln Township test within a week that has failed the other being in Section 2.

Wildcatting Predominates

Wildcat explorations again dominate the current week's list of drilling licenses issued by the Michigan Department of Conservation, no fewer than nine of the 12 permits being for tests in unproved territory. These tests were widely scattered, too, with one in Dorr Township of Allegan County, one in Deep River Township of Arenac County, one in Thornapple Township of Barry County, two in Bentley Township of Gladwin County, one in Milbrook Township of Mecosta County and one each in Edenville and Warren Townships of Midland County.

New Markets Needed

Marketing and research experts offer the Michigan oil industry its best opportunity to create new markets and increase profits, according to Dr. R. A. Smith, state geologist, heading a state conservation department study of the Michigan petroleum situation.

Mr. Smith, set at the task when independent oil operators complained to the commission that refineries and pipe line companies were discriminating against Michigan crude in the fixing of market prices, expects to have his report ready within two weeks. He has enlisted the aid of Prof. C. G. Brown of the University of Michigan's chemical engineering department, who advises that the oil industry in this state develop Michigan crude's potentialities for the production of lubricants.

Canadian Potentials

CHATHAM, Ontario.—In the Turner Valley field, engineers of the petroleum and natural gas division of the Alberta lands and mines department are making good progress with the systematic testing of potential production of the various producers. When the work is completed, a report embodying the results will be issued and proration will be set on the basis of the official figures. It is planned to conduct such tests at regular intervals.

Lower rates on crude from Calgary to various western Canada points have been announced. The rates per 100 pounds are: Weyburn, 29½ cents; Moose Jaw, 26 cents; Regina, 27½ cents; Rosetown, 21½ cents; Saskatoon, 24 cents; Vancouver, 49 cents. On 25-car lots rates will be still lower.

Central West Fields

(Continued from Page 330)

Jewell, dry hole, Bethel sand, 800-823 feet. Water at 818 feet. Total depth 823 feet.

Friendship Church District: Henry Scholl and others No. 3 Ida Farmer 700,000 feet of gas, 100 pounds rock pressure, Jackson sand, 722-734 feet.

Adaburg District: Hall & Booth No. 1 Tom Helm, 250,000 feet of gas, 196 pounds rock pressure in Barlow sand 888-896½ feet; Jett sand, 628-641 oil showing; Jackson sand, 831-868 feet, water. Total depth 896½ feet. Rex-Pyramid Oil Co. No. 16 Len Stinnett, 15 bbls. Jett sand.

Buford District: J. W. Wilson No. 3 Sallie Hudson, 2 bbls., natural, in Jett sand.

Gulf Coast Fields

(Continued from Page 322)

wells producing from various depth from 3,900 to 7,200 feet.

Gulf Oil Corp. No. 3 State, a prospective pool opener for the Timbalier Bay Prospect, Lafourche Parish, was being tested after perforating the casing with six shots from 7,006-10 feet. This structure was proven a salt dome when salt formation was topped at 7,741 feet and drilled to a total depth of 8,728 feet. Two sand sections showing oil have been logged, one at 6,749-6,846 feet showed 1,000 feet of pipe line oil on a drill stem test while another was logged from 6,958 to 7,035 feet. No drill stem test was attempted in the latter section. Location is in section 36-23s-21e.

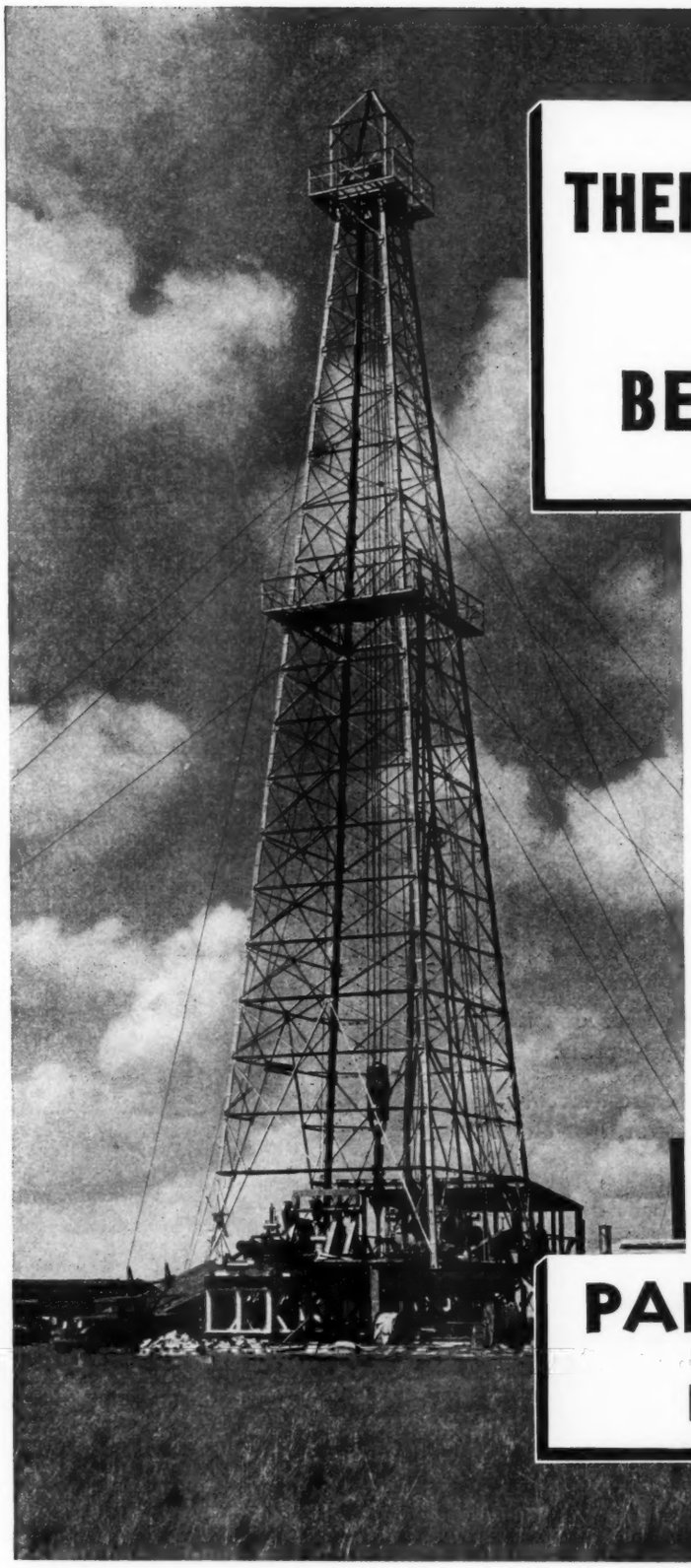
Kansas Fields

(Continued from Page 321)

feet in Arbuckle lime, and was rigging up standard tools to drill in.

Vernon Oil & Gas Co. and I. W. Murfin No. 1 Persons, NE cor. section 31-15-15w, southeast of the Steinert pool, had a hole full of water at 3,464 feet and was dry and abandoned at 3,480 feet, total depth.

Magnolia Petroleum Co. No. 1 Ehly, NW NW SE section 30-17-10w, Bloomer area, was coring at 3,275-85 feet.



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Oklahoma Operations

By
DAL DALRYMPLE

TWO DEEP PRODUCERS NEAR COMPLETION IN FOX FIELD

Major interest in Oklahoma continued to be centered in deep tests in the Fox field of Carter County the past week, although some other areas were not without interesting developments. Activity generally was at low ebb because of the holiday season and customary lessening of field work at the year end.

Gulf Oil Corp. No. 1 Will Smith, C SW SW section 26-2s-3w, in the Fox field, was bottomed at 7,773 feet and was to be completed for daily allowable production of 500 bbls. naturally, operators having decided not to acidize. On a test late in the week it flowed 461 bbls. of 71-gravity oil in 18 hours, with freezing lines retarding production. Casing pressure was 2,400 pounds, tubing pressure was 1,900 pounds. The flow was through three-eighths inch choke on tubing. This well is less than 1 mile east and south of Carter Oil Co. No. 1 Williams, deep sand discovery well of the Fox fields, which continues to produce 500 bbls. of oil daily on proration many months after completion.

The other deep test near completion at Fox, the Gulf Oil Corp. No. 1 Johnson, C SW NW section 27-2s-3w, northwest of the deep discovery, flowed 109 bbls. of oil in a recent 24-hour test from oolitic lime at 7,955 feet. Flow was through 2½-inch tubing, with casing pressure of 300 pounds. It was to be kept open while operators considered further action, which may include reacidization. After originally looking like a dry hole, it began flowing after treating with some 10,000 gallons of acid.

January Recommendations

W. J. Armstrong, oil conservation officer, recommended that Oklahoma crude oil allowable production for January be set at 550,000 bbls., a reduction of 16,600 bbls. daily from the market demand as estimated by the Bureau of Mines. He estimated Oklahoma production will be within the 550,000-bbl. allocation for December, and on that basis the state will end the year some 2,117 bbls. daily under the Bureau of Mines estimated demand.

In Milroy Area

Carter Oil Co. No. 1 Carter-Harley, C NW NW section 19-2s-3w, east offset to the deep pay discovery well in the Milroy shallow field of Stephens County, was drilling below 5,320 feet in Hunton lime. It is across the line in Carter County, and was running considerably lower than the discovery well.

Another well in the Fox area of Carter County attracted attention during the week when it showed an increase in gas production. This was Phillips Petroleum Co. No. 5 Tucker, SE NE NW section 29-2s-3w, which produced 2,500,000 feet of gas after plugging back from 3,807 feet, total depth, to 2,275 feet and perforating pipe. It originally was completed as a 1,000,000-foot gasser in January, 1936.

Southwest of Stillwater in Payne County, Mid-Continent Petroleum Corp. and others No. 1 Ramsey, SW SW NW section 18-18-2e, wildcat, gave indications of opening a new area when the crew recovered 5 feet of saturated core from 4,762-71 feet. Sand cuttings were free of salt water. Seven-inch casing was run and cemented, and testing of the pay sand was expected to be deferred for several days.

Carter Oil Co. No. 1 Claytor, C W half NE SW section 27-2n-9e, Centrahoma area, Coal County, was looking somewhat better than it has recently. It produced 85 bbls. of oil net in 24 hours after acidizing, and was being reacidized.

Kenneth Ellison and Tom Nix No. 1 Metropolitan Life, C NE NE section 14-7-9, Hughes County wildcat, indicated possibilities of opening a new shallow pool when it found good shows of oil in Booch sand topped at 2,960 feet, but operators were drilling ahead below 3,200 feet. Contract depth is 5,100 feet or Wilcox sand, so testing of the shallow showing was deferred until deeper zones are explored.

Phillips Petroleum Co. No. 1 Beeker, NE NW SW section 8-5-10, wildcat south of Calvin in Hughes County, topped Sylvan shale at 5,522 feet and was checking high structurally while drilling ahead below 5,555 feet.

Showing in Garfield

Hollenback & Burton No. 1 Clark, NW cor. section 34-21-6w, wildcat near Waukomis in Garfield County, reported oil stains while drilling in Mississippi lime at 6,490 feet and was preparing to core.

Indian Territory Illuminating Oil Co. and associates No. 1 Dome-Bo, C NE SE section 29-6-10w, wildcat southwest of Anadarko and west of the Cement field in Caddo County, was drilling in sand below 6,650 feet.

Phillips Petroleum Co. No. 1 A. E. Wood, NW SW SW section 31-11-13, wildcat south of Henryetta in Okmulgee County, set casing at 2,861 feet and was drilling below 2,995 feet.

Gulf Oil Corp. No. 1 Thomas, SW NW NW section 14-4-5w, wildcat in southeastern Grady County, was drilling below 9,468 feet.

Deep Rock Oil Corp. and Burke-Greis Oil Co. No. 2 Garrett, SE NE SE section 2-1n-7, on the west side of the Jesse area in Pontotoc County, was shut in after flowing 776 bbls. of oil in 4½ hours through 2½-inch tubing. It was acidized with 7,000 gallons in Hunton lime at 3,843-3,053 feet. A forced south offset will be drilled by Magnolia Petroleum Co.

Other operations in the Jesse area: Mid-Continent Petroleum Corp. No. 10 Statler, NW SE SW section 2-1n-7, was rigging up standard tools at 4,220 feet. Same company's No. 11 Statler, NE SW SW section 2-1n-7, was drilling below 3,741 feet. Continental Oil Co. No. 1 Smith, NW SW SW section 2-1n-7, was acidized with 5,000 gallons and flowed and swabbed 197 bbls. of oil gross, or 17 bbls. of oil net, in 17 hours. Same operator's No. 1 Thompson, CSL NW SW section 35-2n-7, was bottomed at 4,562 feet and was being reacidized.

Tillman County

Indian Territory Illuminating Oil Co. No. 1 Drumm, CWL SW NW section 32-2s-17w, south of Frederick in Tillman County, had a sand showing oil at 3,003-11 feet, found another sand at 3,025-36 feet and stopped there when salt water appeared with the oil.

Big Chief Drilling Co. No. 2 Park Place, NE NE SE NE section 35-12-3w, west of the Oklahoma State fair grounds in the Oklahoma City field, produced 925 bbls. of oil in 24 hours on gas lift at 6,400 feet, total depth.

Bids on 37 tracts of Indian lands aggregating 4,526.68 acres in Caddo, Kiowa and Comanche counties were approved by the Kiowa Indian Agency at Anadarko, following the sale there last week. Bids totaled $12,633.97 for bonuses and $5,657.60 in advance rentals. Most of the purchases were checkerboard protection tracts. The buyers included Carl J. O'Hornett of Tulsa, Quinton Little of Madill, Ohio Oil Co., C. U. Daniels, Mid-Continent Petroleum Corp., and Indian Territory Illuminating Oil Co.

Seminole County

In the North Earlsboro area, Seminole County, Amerada Petroleum Corp. No. 3 Tilghman, SE NE SE section 2-10-5, spudded to 185 feet, set surface casing and was waiting. Atlantic Refining Co. No. 2 South Riddle, NW SW NE section 2-10-5, set 7-inch casing at 4,610 feet, total depth 4,621 feet, and was drilling plugs. Amerada Petroleum Corp. and Stanolind Oil & Gas Co. No. 4 Klabzuba, SW SE SE section 35-11-5, at total depth of 4,653 feet, swabbed 127 bbls. of oil in six hours, with a small amount of water.

Atlantic Refining Co. No. 2 Damron, NW NE NW section 22-6-6, in the Traugh pool, Seminole County, topped Woodford shale at 3,137 feet and was drilling ahead below 3,400 feet.

Estimated Daily Production

Estimated daily production of Oklahoma for the week ending December 25 and for the preceding week was as follows:

	Barrels	
	Dec. 25	Dec. 18
Allen	5,750	6,400
Billings	7,900	7,675
Burbank	7,850	7,875
South Burbank	13,600	13,750
Balance Osage	18,300	18,250
Blackwell district	4,925	4,950
Bristow-Slick	7,025	7,050
Chandler	2,600	2,575
Crescent	8,375	8,575
Cromwell	3,275	3,300
Cushing-Shamrock	10,750	10,800
Duncan district	3,750	3,775
Edmond	11,500	11,950
Fish	4,500	4,650
Fitts	75,250	77,225
Jesse	3,350	3,750
Graham	4,225	4,250
Gray	1,125	1,150
Healdton	9,925	9,900
Hewitt	4,100	4,125
Holdenville	925	825
Keokuk	7,500	7,725
Konawa	1,450	1,550
Lucien	12,000	12,975
Moore	9,500	9,375
Oklahoma City	123,900	138,925
Olympic	7,125	7,025
Polo	675	700
Sasakwa and townsite	2,425	2,575
Sholem-Alechem	3,100	3,125
Seminole County:		
Bowlegs	10,500	10,475
Carr City	4,650	4,675
Earlsboro	5,900	5,825
South Earlsboro	450	675
East Earlsboro	6,675	6,700
Little River	9,175	9,125
East Little River	1,000	1,025
Maud	650	625
Mission	1,875	1,900
Seminole	8,800	8,825
East Seminole	1,750	2,025
Searight	3,950	3,975
Total Seminole	55,375	55,850
St. Louis-Pearson	18,725	18,450
Tatums	6,000	5,975
Tonkawa-Garber-Thomas	4,450	4,500
Wewoka	2,700	2,725
Yale-Jennings	3,900	3,875
Others pools	82,475	82,000
Total Oklahoma	550,300	570,150

Pottawatomie County

Current activity in the North Shawnee pool, Pottawatomie County, was as follows: Southwest Drilling Co. No. 2 Gunter, SE SE SW section 32-11-4, drilling below 2,700 feet; Stanolind Oil & Gas Co. No. 5 Rushing, SE SW SW section 32-11-4, set 7-inch casing at 4,360 feet, total depth 4,380 feet, and was rigging up standard tools, with pay expected around 4,600 feet. Mid-Continent Petroleum Corp. and others were moving in material at No. 1 McClellan, SE SE NE section 24-11-4.

Carter County

Carter Oil Co. and Gulf Oil Corp. No. 2 Berry, NW NE NW section 5-1s-3w, Carter County sector of the Tussy field, was drilling plug at 3,300 feet, total depth 3,377 feet. It had been recemented to shut off water which intruded when plug was drilled when casing originally was cemented.

Ben G. Barnett No. 2 Hooks, NE NW SW section 14-1s-3w, Tatums pool, Carter County, was drilling ahead after setting surface pipe. It is an offset to a 300-bbl. well completed in the shallow pay of this area more than seven years ago.

Eastern Field Report

By STAFF CORRESPONDENT

BEST ORISKANY SAND WELL IN WESTERN PENNSYLVANIA

PITTSBURGH, Pa., Dec. 27. — In Beaver County, Southwest Pennsylvania, John T. Galey and others completed the test on the James Tennis Heirs farm in South Beaver Township as the best Oriskany gas well in lower Pennsylvania. After a lime section of 212 feet, the Oriskany was topped at 4,604 feet and at 4,607 feet there was a fair showing of gas which increased to 3,000,000 feet a day. The hole was then cased and deepened to 4,613 feet and shut in without shot.

In the deep test of Norwood P. Johnston and others on the James McBurney farm, Mount Pleasant Township, Washington County, Pennsylvania, the tools have reached 6,740 feet or 45 feet in the Oriskany which continues as a clear sand slightly coarser.

During the week 26 operations were reported from the lower eastern fields, of which 6 were dry, 16 gas wells, and 4 producers with an initial production of 57 bbls. a day. Operations are gradually being shut down for the holiday season, and in addition fewer new locations are being reported.

Only three operations were reported completed in Southeast Ohio. In Lorain County, the Wittmer Oil & Gas Properties drilled a test on the H. B. Belden farm in Lot 98, Grafton Township, through the Clinton sand to 2,733 feet. It was a dry hole.

In Medina County, E. R. Edson & Son Co. completed No. 36 W. H. Ripley farm, section 13, Chatham Township, in Berea sand at 464 feet. It produced 16 bbls. the first day.

In Perry County, the Gas Producing Co. of Ohio completed a combination 400,000-foot gasser and 10-bbl. oil well on the Mary E. Koehler farm, section 18, Clayton Township, in the Clinton sand at 3,190 feet.

SOUTHWEST PENNSYLVANIA

In Southwest Pennsylvania, one producer and three gas wells were completed. In Amwell Township, Washington County, the Union Gasoline & Oil Corp. deepened the A. O. Vankirk No. 8 from 2,660 feet to the Fifth sand topped at 3,013 feet with oil showing at 3,018-24 feet. It is estimated good for 30 bbls. a day.

In Richhill Township, Greene County, Smith McCracken completed the test on the Asa Hughes farm at 3,175 feet. With the Pittsburgh Coal at 1,075-81 feet, the Fifty-foot sand was at 3,085-3,116 feet with 75,000 feet of gas at 3,088 feet. The Gordon sand was at 3,157 feet with some gas at 3,159-70 feet. A shot did not help.

In Jackson Township, Greene County, the Equitable Gas Co. deepened the P. D. Phillips gas well to 3,580 feet. The Gordon Stray sand was at 3,116-48 feet, with 68,000 feet of gas at 3,132-37 feet; Fifth sand, 3,320-35 feet, with some gas at 3,326-29 feet. The total gauge was 125,000 feet a day.

In Center Township, Greene County, Charles Mong and others are drilling in the Nineveh Thirty-foot sand in the Jesse L. Metz No. 2. The sand was topped at 3,203 feet and the tools are 5 feet in. The South Penn Oil Co. is building the rig for the No. 12 Samuel Harvey. The Carnegie Natural Gas Co. has the rig standing for the No. 3 J. H. Orndoff.

In Wayne Township the Manufacturers Light & Heat Co. is down 2,130 feet in the test on the Haddie J. Ross farm with the Big Injun sand at 2,042 feet and a show of gas at 2,055 feet. The Equitable Gas Co. is drilling No. 4 Sanford C. Brock at 2,936 feet. Eddy & Johnson have reached 1,730 feet in No. 2 E. W. Maple.

In Washington Township, Greene County, Charles Mong and others are drilling at 2,025 feet the No. 2 Jacob Johns with the Big Injun topped at 1,907 feet. In Dunkard Township, J. L. Garard began deepening the test on the N. Minor farm at 1,890 feet and are down 2,085 feet.

In Richhill Township the Natural Gas Co. of West Virginia have started drilling a second test on the D. G. Rush farm. Burleigh Wright has reached 2,860 feet on the Rush heirs farm.

Washington County

In Amwell Township, Washington County, the Carnegie Natural Gas Co. is drilling at 2,308 feet on P. W. Reynolds farm. In South Franklin Township the South Penn Oil Co. is down 875 feet in No. 3 Piedmont Coal Co.

In Morris Township the Duquesne Gas Co. is drilling at 2,751 feet on D. B. Hughes test, with the Fifty-foot sand at 2,733 feet and 167,000 feet of gas at 2,735 feet. In East Finley Township, Parkinson, Plants and others are drilling at 2,409 feet on L. A. Phillips farm.

In Peters Township, R. M. Duddin and others have reached 2,285 feet in No. 2 J. E. Johnston. In Smith Township the Citizens Water Co. is down 1,670 feet in No. 1 J. T. Simpson. In Cross Creek Township, Milliken, Pethtel and others are drilling at 1,220 feet on W. C. Campbell test. In Mount Pleasant Township, McGuigan Oil & Gas Co. is down 2,300 feet in No. 1 W. W. McCarroll.

Deep Tests

On Chestnut Ridge in South Union Township, Fayette County, the test of the Potter Development Co., William E. Snee and others, on the Summit Hotel property, is making fast time and is drilling at 5,350 feet. The hole is not caving badly.

In Allegheny County, the South Penn Oil Co. and others will cement and set a whipstock in the test on the Christian Z. Schove farm in Hampton and drill past the lost tools. It is estimated that with cementing back the hole there will be less than 300 feet to drill to reach the Onondaga.

WEST VIRGINIA

In Gilmer County, West Virginia, Carnegie Natural Gas Co. completed the test on the Rohrbough and Peters land in DeKalb district at 1,867 feet with the Maxton sand at 1,795 feet and 10 bbls. of oil and 37,000 feet of gas at 1,834-44 feet.

In Tyler County, Cottrell & Britton completed a 1-bbl. well on the Parker farm in Union district in the Injun sand at 1,553 feet and A. S. McCullough drilled a test on the Abijiah Wells farm to 700 feet and found no sand and abandoned it.

Gas Wells

In Cabell County, E. L. Lusher test on the Lemmings farm in McComas district is a gas well gauging 900,000 feet a day at 3,553 feet.

In Calhoun County, in Lee district, Ira Connolly drilled a dry hole on the Dr. C. C. Connolly farm through Berea sand to 2,223 feet. In Sheridan district, Chemical Oil & Gas Co. deepened the No. 3 J. H. Fling, a former Injun sand gas well, to 2,500 feet through the Berea sand and it was dry.

In Lincoln County, United Fuel Gas Co. completed No. 4,774, Huntington Gas Development Co. lease, Sheridan district, to 3,248 feet as a gas well gauging 260,000 feet a day.

In Monongalia County, Clay district, Pittsburgh & West Virginia Gas Co. No. 5,232 on the J. C. Sine farm was dry and abandoned at 2,161 feet.

In Ritchie County, W. H. Bickel test on the G. S. Evans farm in Murphy district had Injun sand at 1,985 feet and gauged 300,000 feet a day.

In Roane County, the United Fuel Gas Co. completed No. 4,775 D. M. Willis and others lease, Smithfield district, as a gas well good for 2,160,000 feet per day at 1,495-97 feet.

In Upshur County, Cumberland & Allegheny Co. completed No. 283 on the W. H. and W. M. Winemiller farm in Buckhannan district at 3,970 feet. The Benson sand at 3,864-69 feet yielded 75,000 feet of gas per day.

Oriskany Gas Field

In the Poca district, Kanawha County, West Virginia Gas Corp. test on the Eldridge Fisher and others lease was completed at 4,974 feet with the Oriskany topped at 4,964 feet and a volume of 12,867,000 feet a day. The same company's test on the J. M. Burgess farm topped the Oriskany at 4,825 feet and was bottomed at 4,841 feet with a volume of 12,500,000 feet a day. Hays Oil & Gas Co. completed a test on the Humphreys and Good farm at 4,785 feet with the Oriskany sand topped at 4,770 feet and a total gauge of 8,269,000 feet a day.

In Union district, Kanawha County, Godfrey L. Cabot, Inc., completed the test on the Fred Strasser farm at 4,894 feet as a 2,500,000-foot gas well in sand topped at 4,869 feet. In this district, the test of the Columbian Carbon Co. on the C. B. Cavender and others lease is a 300,000-foot gas well from Oriskany sand topped at 5,104 feet; total depth 5,162 feet.

In Loudon district, the Columbian Carbon Co. drilled a deep test, No. 6 Susan Hoge, through the Oriskany sand and it was dry. The Corniferous lime was at 4,547 feet; Oriskany, 4,649 feet; total depth, 4,740 feet.

No new locations were announced for this section during the week. Several reached the lower Devonian but may not be drilled in until after the holidays. In Elk district the Columbian Carbon Co. topped the Corniferous at 5,010 feet in the test on the F. A. Hughart farm.

In Poca district the United Carbon Co. topped the Corniferous lime at 4,653 feet in the test on the R. E. Eagan and others lease. The United Fuel Gas Co. reached the Corniferous at 4,684 feet in the No. 4762 on the Mamie A. Ray farm and 4,636 feet in the No. 4739 W. J. Glass farm. Guy B. Ray reached this formation at 4,820 feet in the test on the Harry Thaxton farm. Everett Starcher struck it at 5,071 feet in the test on the W. M. Drake farm. The West Virginia Gas Corp. reached the Corniferous at 4,892 feet in the D. F. Legg test. The Hays Oil & Gas Co. topped it at 4,765 feet in E. A. and J. E. Humphreys test. The Trenton Gas Co. is drilling at 4,929 feet with the Corniferous at 4,879 feet in the L. E. Campbell test.

Deep Tests

In Wirt County, the test of the Carnegie Natural Gas Co. on the W. O. Caplinger farm in Tucker district passed through the Oriskany sand at 5,346 feet after a thickness of 39 feet of extremely hard sand void of any showing. It is now drilling at 5,434 feet in a dark brown formation turning hard. This test may be drilled down to the Newburg if no serious difficulties are encountered.

In Steel district, Wood County, the Belmont Quadrangle Co. is cementing back to 3,800 feet after a fishing job and loss of tools in the test on the D. C. White farm. In Tygart district, some oil is still being bailed from the test on the Reese Blizzard farm by W. H. Bickel. It is expected that the Oriskany sand will be shot in this test. The total depth is 4,690 feet.

In Clay County, the Pittsburgh & West Virginia Gas Co. is drilling at 4,985 feet in the test on the Jesse Chapman farm in Otter district. In Jackson County, the Potter Development Co. is fishing at 1,067 feet on the William Chancey farm in Ripley district. In Ravenswood district, W. H. Petry is down 4,612 feet in the test on the D. O. Curry farm.

Other Operations

New deep drilling in wildcat tests is not expected to be resumed until after this winter due to the additional costs. Deep drilling will however be continued in the Oriskany gas field in the Charleston area.

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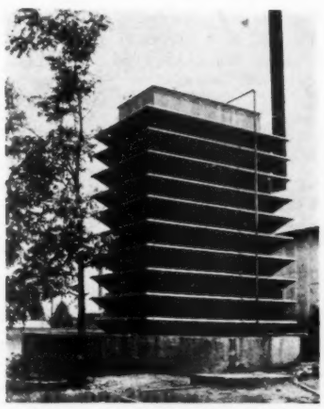
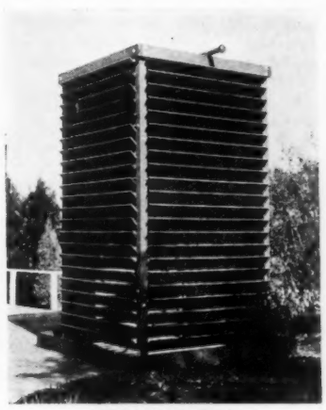
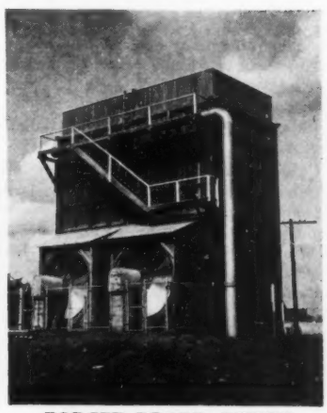


SMALL ATMOSPHERIC TOWER



SPRAY TOWER



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West and North Texas

By MITCHELL TUCKER

40,000 ACRES IN K.M.A. FIELD ALREADY PROVEN TERRITORY

FORT WORTH, Tex., Dec. 27.—The rapidly developing K.M.A. field of Wichita County continues to head all other developments in the North and West Texas districts. Eighteen new locations were announced during the last seven-day period, and as the week closed there were 43 locations or rigging up wells, with 59 wells drilling, some in the process of completion.

The Texas Railroad Commission proration order for North Texas, effective for the 30-day period beginning December 18, showed 77 completions in K.M.A. deep sand pool as of that date, having an aggregate allowable of 3,940 bbls., or an average of 51 bbls. per well per day. Allocation at K.M.A. is upon a potential basis, but in no case is a well granted a potential greater than 500 bbls. per day, regardless of what it is capable of producing. On the recent proration schedule, only eight wells out of the 77 were incapable of making the peak potential of 500 bbls. per day, and many gauged considerably more than this amount.

Lease trading continues in all directions from the present deep development. It is particularly following the flanks of the old shallow production extending up toward the Electra field to the northeast. All of the leases in the shallow fields are being held in strong hands by the smaller stripper production, and trading in that territory is slow and at high prices. Royalty deals are rather limited due to the small number of offerings being made.

The proven area at K.M.A. is now estimated to be about 40,000 acres, without any definition of the pool's limits in any direction. Estimates of recovery range from 8,000 to 12,000 bbls. per acre. Speculation is running high as to the probable ultimate extent of the field and its productivity, but at any rate, the present producing area indicates it to be probably 1937's most important development insofar as the addition of new reserves is concerned.

West Central Texas

A new field opened in northwestern Jones County headed developments in West Central Texas last week. Grisham-Hunter Oil Corp. No. 1 E. D. Appling, section 31, Block 1, B.B.B.&C. Survey, was originally begun as a test of the Palo Pinto lime expected at about 4,000 feet. However, the King sand was topped at 2,638 feet, and saturation appeared after taking only 2 feet penetration to the present total depth of 2,640 feet. After setting casing below a water sand at about 2,590 feet, the well filled 500 feet with oil. When placed on the pump it gauged 7 bbls. per hour. Operators have not yet announced whether or not they will complete the well at this depth or drill deeper a few feet in the King sand.

In Shackleford County, Heltzel-Kleiner No. 1 J. P. Morris, E. T. Survey, 2 miles east of Bluff Creek pool, failed to produce in the Tannehill sand, and is drilling ahead below 2,000 feet for a test of the Canyon series.

West Texas

The Harper pool of Ector County continues to grow in importance as its best producer was completed last week. Broderick & Calvert No. 4-C Cowden, T.&P. Survey, flowed 2,410 bbls. of oil in 24 hours after shooting with 670 quarts, total depth 4,282 feet.

Ector County

Oil Well Drilling Co. No. 1-B Cowden, SW cor. section 14, Block 44, Township 2s, T.&P. Survey, was drilling below 4,185 feet close to the next deeper pay horizon, 4,200 feet. The well was flowing at the rate of 375 bbls. per day while drilling from pay at 4,080-85 feet.

L. H. Wentz No. 1 Texas Pacific Land Trust, section 27, Block 44,, which had flowed 840 bbls. of oil in 12 hours, was given a 24-hour test, flowing 1,392 bbls. of oil through 2½-inch tubing.

L. H. Wentz No. 1-B Parker, NE NW section 21, Block 44, was drilling below 4,200 feet with 3,000 feet of oil in the hole. Pay was from 4,140-46 feet, with an increase at 4,180 feet.

Honolulu Oil Corp. and Black Brothers No. 3-A Cowden, in section 23, Block 44, flowed 585 bbls. of oil in 24 hours from 4,291 feet after a 610-quart shot.

In the Foster pool of Ector County Barnsdall Oil Corp. No. 6 F. Foster, section 13, Block 43, Township 2s, T.&P. Survey, total depth 5,175 feet, flowed 1,063 bbls. of oil in 24 hours on potential test, after shot of 600 quarts.

Barnsdall Oil Co. No. 3 Johnson, section 7, Block 42, total depth 4,290 feet, flowed 521 bbls. of oil in 24 hours after a 370-quart shot.

Gulf Oil Corp. No. 58 Goldsmith, section 4, Block 44, Township 1s, T.&P. Survey, total depth 4,205 feet, in the Goldsmith pool Ector County, was rated potentially at 3,348 bbls. per day based on last six hours of a 12-hour flow test. The well had been acidized with 3,000 gallons of acid.

Gulf Oil Corp. No. 57 Goldsmith, section 4, flowed 24 bbls. in four hours and was running tubing to acidize. Total depth is 4,215 feet.

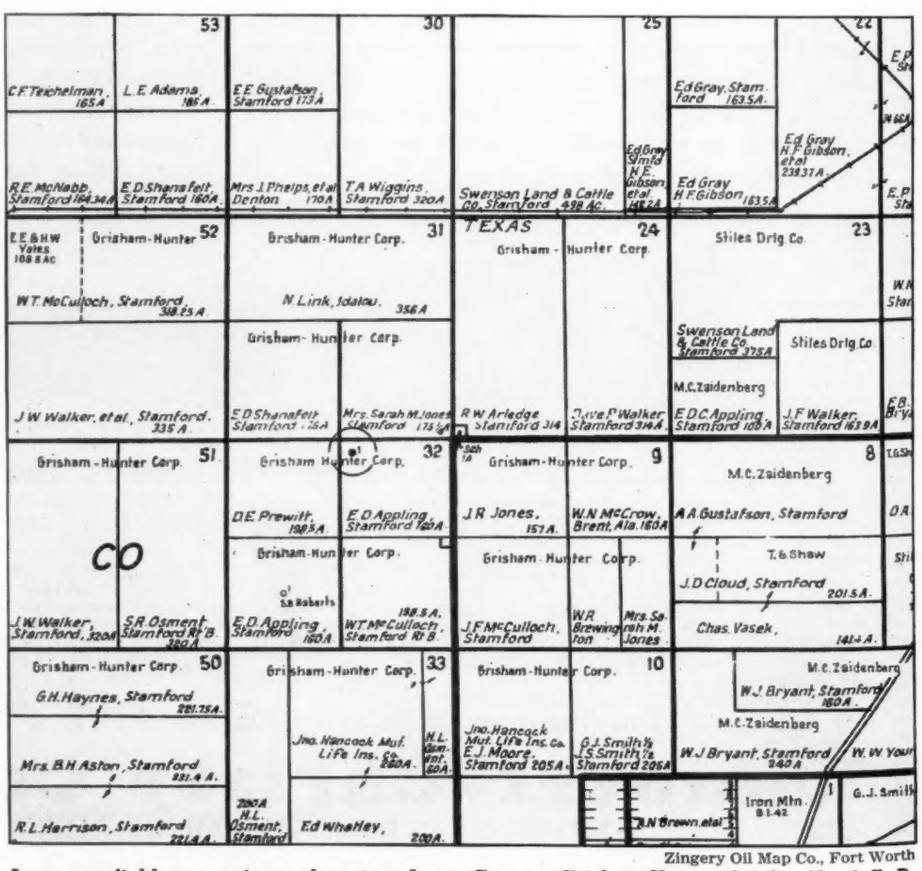
Yoakum County

In the extreme northwestern corner of Yoakum County a possible new field opener was indicated last week. Pipkin & Stogner No. 1 Brock, NE of section 103, Block D, John H. Gibson Survey, drilled a section carrying streaks of saturated lime from 5,204-30 feet. A tightening of the lime was reported below 5,230 feet, and operators plan to test the attractive zones above, from which several bleeding cores were recovered.

Shell Petroleum Corp. will stake location for an extension test a mile and a quarter east and slightly south of its No. 1-A (formerly No. 1) George Baumgart, which extended the Denver area in Yoakum eastward. The Shell test will be No. 1-C George Baumgart, 2,200 feet from the west, 440 feet from the north line of section 866, Block D. John H. Gibson Survey.

Another Shell location is No. 1-B Baumgart, 1,320 feet from the south, 440 feet from the east line of section 829, Block D, Gibson Survey, offsetting No. 1-A Baumgart on the west. Shell Petroleum Corp. has five sections of Baumgart land under lease, sections 826, 827, 828, 829 and 866, Block D, Gibson Survey. Production must be obtained on each individual section to hold lease.

Shell Petroleum Corp. No. 1-A Baumgart, after it had flowed off acid water for 18 hours, was turned into tanks and produced 13½ bbls. per hour for four hours. Flow is increasing as acid water leaves the formation. Earlier, after initial treatment with 4,000 gallons, the well flowed 380 bbls. in 30 hours; then,



Zingery Oil Map Co., Fort Worth

As a new field opener in northwestern Jones County, Grisham-Hunter Oil Co. No. 1 E. D. Appling, in section 32, B.B.B.&C.R.R. Survey, found unexpected saturation in the King sand at 2,638 feet and has been tentatively completed as a 7-bbl. per hour pumper

Oil Man's Calendar

January

10-14—Detroit, Mich. Society of Automotive Engineers, Book-Cadillac Hotel.
13—Oklahoma City, Independent Oil Jobbers Association of Oklahoma.
17-21—Cleveland, Ohio, American Road Builders Association.
24—Hot Springs, Ark. Governor Marland's Petroleum Conservation Conference of Oil State Governors.
24-25—Minot, N. D., Northwest Petroleum Association, North Dakota Division.
27-28—Minneapolis, Minn., Northwest Petroleum Association, Minnesota Division, Hotel Radisson.

February

3-4—Lubbock, Tex. Third Welding Conference, Texas Technological College.
7-9—Louisville, Ky., Kentucky Petroleum Marketers Association, Brown Hotel
14-15—Wichita, Kans. Kansas Oil Men's Association, twenty-fourth annual convention, Hotel Broadview.
14-18—New York, American Institute of Mining and Metallurgical Engineers, annual meeting, Engineering Societies Building.
17-18—Amarillo, Tex. American Petroleum Institute, Division of Production, spring meeting, Herring Hotel.
22-24—Milwaukee, Wis. Wisconsin Petroleum Association, Schroeder Hotel.
22-24—Columbus, Ohio, Ohio Petroleum Marketers Association, fifteenth annual convention and marketing exposition, Deshler-Wallick Hotel.

March

2-3—Indianapolis, Ind., Indiana Independent Petroleum Association, spring meeting.
7—Rochester, N. Y., American Society for Testing Materials, Spring Regional Meeting and Group Committee Meetings.
16-8—New Orleans, twenty-third annual meeting, American Association of Petroleum Geologists, Roosevelt Hotel.
23-25—Los Angeles, Calif. American Society of Mechanical Engineers.
24-25—Fort Worth, Tex. American Petroleum Institute, Division of Production, spring meeting, southwestern district, Blackstone Hotel.

April

4-6—Cincinnati, Ohio, A.G.A. Distribution Conference, Netherland Plaza.
13-15—Cleveland, Ohio, National Petroleum Association.
13-15—Houston, Tex., Petroleum Industry Electrical Association.
17-21—Dallas, Tex., American Chemical Society.
20-22—Buffalo, N. Y., American Institute Mining and Metallurgical Engineers, Open Hearth Conference.
28-29—Pittsburgh, Pa. Spring meeting, Eastern District, A.P.I. Division of Production, William Penn Hotel.

May

11-13—Tulsa. Natural Gasoline Association, Hotel Tulsa.
12-14—Tulsa. National Oil Scouts Association of America.
14-21—Tulsa. International Petroleum Exposition.
23-25—Wichita, Kans. American Petroleum Institute, eighth midyear meeting.
(?)—New Orleans, La. American Gas Association, Natural Gas Department.
(?)—Tulsa, Okla., Natural Gasoline Association of America.

June

6—Houston, Tex. Oil Workers International Union.
16-18—Pittsburgh, Pa. Pennsylvania Grade Crude Oil Association.
20-24—St. Louis, Mo. American Society of Mechanical Engineers.

after a two-day shut-in period, was opened, to flow 132 bbls. in six hours, with an average gas-oil ratio of 2,040 to 1. The well is 1,320 feet from the south, 440 feet from the west line of section 828, Block D, John H. Gibson Survey. It is bottomed at 5,000 feet in lime with 2-inch tubing set at 4,996 feet.

Denver Producing & Refining Co. No. 1-A Whittenburg, which extended the Denver area a mile east in November, was given its potential test in the past week. It produced 559.78 bbls. of oil in 24 hours, flowing through tubing. The well topped pay at 4,906 feet, total depth 5,084 feet, and was acidized.

Denver Producing & Refining Co. No. 2 Whittenburg, west offset to No. 1-A, which was acidized with 1,500 and 6,000 gallons, flowed 30 bbls. of oil hourly through 2½-inch tubing. The well is not completed.

Gaines County

Continental Oil Co. and Amon G. Carter No. 2 Wasson, in the Wasson pool, Gaines County, flowed 42½ bbls. of oil hourly for five hours, with 2,420,000 feet of gas daily with the drill pipe still in the hole.

Continental & Carter No. 3 Wasson was treated with 1,000, then 3,000 gallons of acid, and flowed 55 bbls. of oil an hour, with 688,000 feet of gas. Total depth is 4,982 feet.

In the Crane County search for Ordovician production Wilcox Oil & Gas Co. No. 1 McKnight, 12 miles north of the Sands Hill field, is drilling below 6,510 feet.

In the Sands Hills area, Permian lime pay, Humble Oil & Refining Co. No. 15 Tubbs was an east extension completion last week, flowing 3,217 bbls. in 24 hours after acidizing the lime from 4,375 to 4,435 feet with 4,000 gallons of acid.

Honolulu Oil Co. has added a one-half mile extension southward to the Bennett pool of Yoakum County in their No. 2 Bennett, which is now flowing 30 bbls. hourly after acidizing with 1,500 and 4,000 gallons, total depth 5,245 feet.

Panhandle

Hearing has been started to test the validity of the Texas Railroad Commission's most recent gas proration order covering the sweet gas area of Wheeler County, Texas. The case is being tried before three fderal judges at San Antonio, and was brought by Consolidated Gas Utilities Corp. When the commission issued its order in November which made the second attempt to prorate Panhandle gas, it was generally understood that the order would be tested in the courts before it was extended to other parts of the field, or to other fields in the state.

The order under question attempts to prorate gas withdrawals on the basis of two-thirds of the allocation to the product of the acreage times the well pressure, and one-third of the allocation to the potential of the well.

There are 10 major and minor gas lines in this field, with 397 producing gas wells having a daily potential of 6,843,783,000 feet. A total of 43,632 acres is affected by the order.

B. C. Petroleum Board

VICTORIA, British Columbia.—Premier Pattullo of British Columbia has announced that the legislature at its present session will make provision for appointment of a coal and petroleum control board, to regulate these two industries in the province.

from A to Z...

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B—Base Maps
C—Co-ordinated
D—Dependable
E—Economical
F—Field Maps
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I—Informative
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K—Keys to Oil Data
L—Lease Ownership
M—More Information
N—Numerous Users
O—Oil Development
P—Practical
Q—Quick Service
R—Readable
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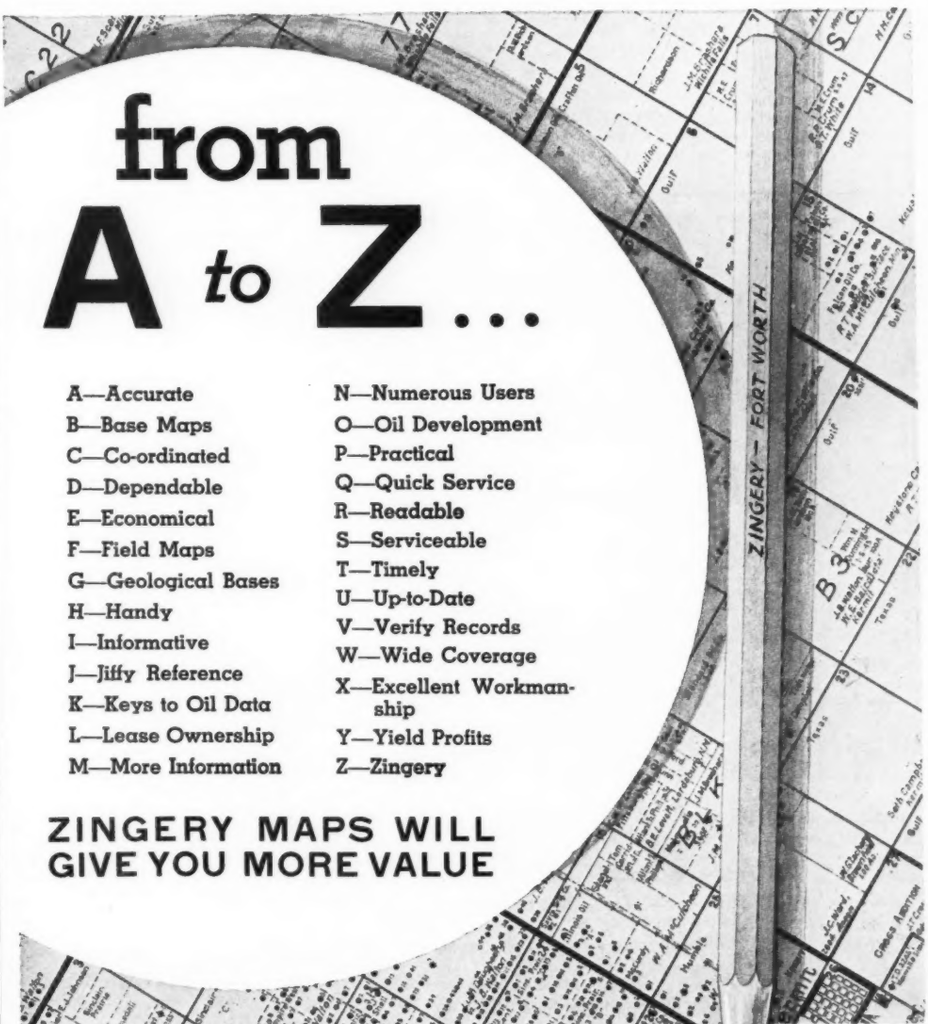

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County ownership, Oil Field and General Area Combination Maps—with oil Development up-to-date. Oil and Gas Field Map of State of Texas will be sent on request without obligation. Limited quantity.

East and East Central Texas

By MITCHELL TUCKER

DEEP EASTERN TEXAS TESTS NEARING CRITICAL HORIZONS

DALLAS, Tex., Dec. 27.—Completions decreased and locations increased in the East Texas field in the past week. New locations jumped from 47 to 54, and completions fell from 56 to 40. The great majority of new work in East Texas is in Gregg County.

Deep Mexia Test

Pure Oil Co.'s deep test, No. 16-T Kendrick in the P. Varella Survey, on the south flank of the Mexia pool, was shut down at 6,442 feet until after Christmas. The hole was originally drilled to 8,860 feet, and where the 7-inch casing stuck resulting in an impossible fishing job. The pipe is now being cut out from the inside in lengths of about 60 feet each, and has been recovered to a depth of 6,442 feet.

Percilla Wildcat

Tom Mayberry of Tyler, Tex., has staked location for No. 1 W. W. Wilson, on the G. W. Wilson Survey of Houston County. This is 6 miles southeast of the C. & G. Oil Co.'s dry hole and 3 miles northeast of Placid Oil Co. No. 1 Elliot, the discovery well of the Percilla field, completed last June with an initial production of 77 bbls. per day. The new location has a contract depth of 6,000 feet and Humble, Sinclair, Skelly, Shell, Cities Service, Gardner, and Tide Water oil companies have made dry hole contributions.

Talco Allowable Reduced

The Talco pool received a rather drastic cut in its allowable on the new proration schedule effective December 18. Production for the entire field was reduced 6,000 bbls., or to 26,870 bbls. per day without making any allowance for new completions. This represents a per well cut of about 10 bbls. per day, reducing the daily allowable per well to about 41 bbls. per day.

Kelsey Dome Wildcat

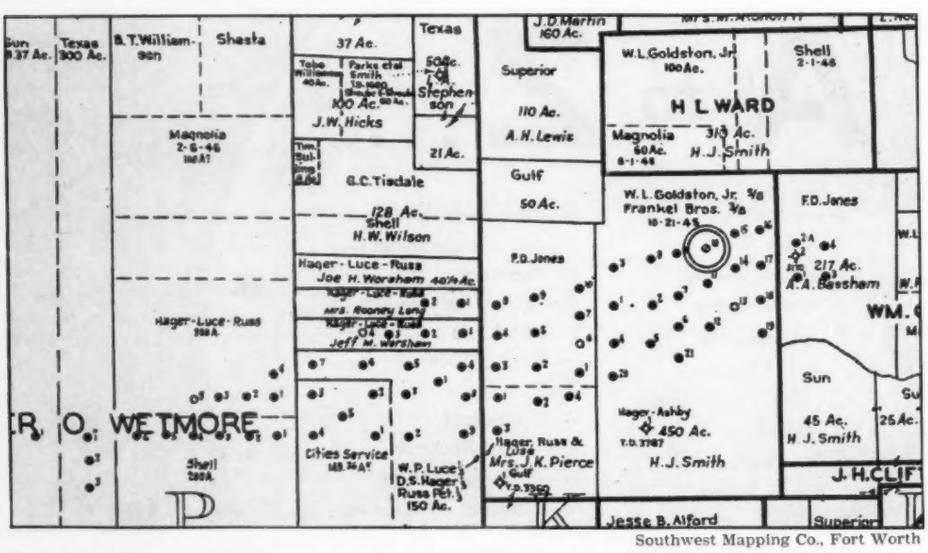
The deep test on the Kelsey Salt dome of central Upshur County which started drilling a few weeks ago is now below 3,400 feet. The well is the Tom Hunter and American Liberty Oil Co. No. 1 J. P. Carter and has a contract depth of 9,000 feet. This is located in the J. H. Field Survey, 1 mile north of Kelsey and is seeking production from the deep sands of the Lower Trinity series.

Gregg County Test

The important deep exploratory well on the east flank of the East Texas field, Gulf Oil Corp. and Humble Oil & Refining Co. No. 1 Robertson, in the M. Mann Survey 2½ miles southwest of Longview in Gregg County, is now coring sandy shale at about 7,600 feet, after having a slight gas show last week.

Sulphur Bluff

Walter Goldston No. 10 H. J. Smith, a deep test in the Sulphur Bluff field of northeastern Hopkins County, has passed the 5,000-foot marker. After logging unattractive showing in the Paluxy sands at about 4,600 feet last week the well was drilling at the close of the week below 5,100 feet.



Southwest Mapping Co., Fort Worth

Sulphur Bluff's deep exploratory test on its structural peak. Walter Goldston No. 10 H. J. Smith is now drilling below 5,100 feet in search of oil in the Trinity series

Anderson County

Humble Oil & Refining Co. No. 1 Southern Pine Lumber Co., located 2 miles east of Jarvis in the John Morton Survey of Anderson County, is drilling below 8,952 feet.

Long Lake Field

Hunt Oil Co. No. 1 City of Palestine, first well on airport property in the Long Lake field, was disappointing last week when it failed to flow after swabbing for several hours. Strong gas showings indicate that the well may be completed as a gasser. This is the first well to be drilled on the 265-acre tract of airport land leased from the city in 1933.

EAST TEXAS FIELD COMPLETIONS

Gregg County

Amerada Petroleum Co. No. 18 Killingsworth, 3,571-3,600 feet, 51 bbls. per hour. Magnolia Petroleum Co. No. 15 C. E. Davis, 3,586-96 feet, 60 bbls. per hour. Shell Petroleum Corp. No. 10 Boston Moore, 3,515-78 feet, 70 bbls. per hour; No. 11 Boston Moore, 3,543-98 feet, 60 bbls. per hour. Stanolind Oil & Gas Co. No. 8-A Beulah Jones, 3,623-96 feet, 50 bbls. per hour; No. 11-A Stuckey-Thrasher, 3,533-96 feet, 38 bbls. per hour. Tide Water-Stanolind No. 6 G. B. Tenery, 3,579-97 feet, 50 bbls. per hour. Hugo Allen No. 2 Ben Bean, 3,590-3,618 feet, 30 bbls. per hour. W. W. Bradley No. 13 S. King, 3,630-31 feet, 30 bbls. per hour. Gulf Oil Corp. No. 30 A. Muckelroy, 3,558-65 feet, 69 bbls. per hour. Humble Oil & Refining Co. No. 27 J. A. Knowles, 3,545-3,607 feet, 65 bbls. per hour. T. L. James No. 17 Lawson Lacy, 3,534-97 feet, 40 bbls. per hour. Johnston and Owens No. 9-C M. T. Cole, 3,521-32 feet, 46 bbls. per hour. Overton Refining Co. No. 18 I.&G.N.R.R., 3,543-61 feet, 50 bbls. per hour. Sun Oil Co. No. 36 Hilburn-Loyd, 3,643-44 feet, 45 bbls. per hour. United East & West No. 5 G. Benson, 3,659-60 feet, 20 bbls. per hour.

Rusk County

Ben Barnett No. 4 I.&G.N.R.R., 3,625-41 feet, 50 bbls. per hour. Devonian and Gulf Oil Corp. No. 42 R. A. Matley, 3,698-3,708 feet, 1 bbl. per hour. G. W. Donnell No. 1 Fannie Buckner and others, 3,780-81 feet, 5 bbls. per hour. Francis Oil Co. No. 5 J. H. Scoggins, 3,652-53 feet, 60 bbls. per hour. Magnolia Petroleum Co. No. 20 W. P. Moore, 3,680-95 feet, 60 bbls. per hour. Meco Production Co. No. 14 fee, 3,697-98 feet, 60 bbls. per hour. Stantex No. 7 Lillie Morse, 3,592-3,625 feet, 40 bbls. per hour. M. Despot No. 3 W. O. Alford, 3,740-41 feet, 30 bbls. per hour. Humble Oil & Refining Co. No. 8 D. C. Joiner, 3,697-98 feet, 70 bbls. per hour; No. 56 W. L. Price, 3,682-92 feet, 56 bbls. per hour. Hunt Oil Co. No. 11 Woolley, 3,694-3,782 feet, 14 bbls. per hour. Milford Oil Co. No. 12 M. A. Thrash, 3,710-34 feet, 80 bbls. per hour. J. T. Smith No. 5 Fredricks, 3,578-3,678 feet, 4½ bbls. per hour. J. B. Sneed and others No. 5 Green Gossett, 3,680-81 feet, 10 bbls. per hour. Tex-Jersey Oil Co. No. 4-B W. P. Keeling, 3,756-66 feet, 64 bbls. per hour. Ward Oil Co. No. 34 E. S. Thrash, 3,766-3,802 feet, 47 bbls. per hour.

Smith County

Sun Oil Co. No. 11 M. M. Burns, junked and abandoned at depth of 1,154 feet.

Upshur County

General American No. 18-B A. J. Saunders, 3,650-65 feet, 66 bbls. per hour. Humble Oil & Refining Co. No. 39 I. D. Smith, 3,616-71 feet, 48 bbls. per hour. W. L. Pickens No. 13 T. Wells, 3,709-12 feet, 45 bbls. per hour. E. H. Smith No. 3 W. M. Landers, 3,701-06 feet, 60 bbls. per hour. Sun Oil Co. No. 21 J. Hargraves, 3,673-74 feet, 80 bbls. per hour; No. 6 A. B. Mackey, 3,640-41 feet, 20 bbls. per hour.

EAST CENTRAL TEXAS COMPLETIONS

Anderson County

In the Cayuga field, Tide Water-Seaboard Oil Co. No. 4-B N. N. Wills, 4,037-84 feet, 157 bbls. per day.

Franklin County

In the Talco field, Housh & Thompson No. 9 O. Wings, 4,108-4,270 feet, pumped 367 bbls. per day. Humble Oil & Refining Co. No. 51 A. P. King, 4,247-4,307 feet, pumped 341 bbls. per day. Magnolia Petroleum Co. No. 4 O. S. Maxton, 4,279-4,306 feet, pumped 60 bbls. per day.

Henderson County

A wildcat, Tide Water-Seaboard No. 1 McElreath & Suggett, made 7 bbls. per day with the total depth of 7,195 feet.

Hunt County

A wildcat, Terola Land Corp. No. 1 J. M. Goin, was dry and abandoned at a total depth of 1,010 feet.

Limestone County

A wildcat, C. L. Brown No. 27 N. B. Boyd, was dry and abandoned at a total depth of 1,558 feet.

Canadian Fields

Completions and Operations in Northwest and in Ontario

By VICTOR LAURISTON

CHATHAM, Ontario, Dec. 25.—On the west side of South Turner Valley, West Flank Oil Co. No. 1, LSD 1, section 32-18-2w5, finished 450 feet in the Madison limestone at 7,150 feet depth, was given acid treatment, and is officially rated at 425 bbls. a day with allowable production of 149 bbls. Further tubing adjustments are being made to increase production. This is the first of a series of six tests to be drilled by the West Flank company in the southeastern portion of section 32.

In the southwestern extension of the field, Royal Canadian Oils No. 1, LSD 15, section 20-18-2w5, was finished at 7,416 feet after getting the limestone at 6,960 feet. Official tests show 764 bbls. natural potential production, with allowable of 267 bbls. Tubing adjustments are being made and the well will be acidized later. The well was drilled by Royalite Oil Co., which holds a royalty interest after repayment of the drilling outlay out of production. Location is a mile due south of No. 1 Commoil and a half mile west of the earlier crude producers.

In section 29-18-2w5, National Petroleum Corp. No. 1, S half LSD 8, is flowing around 1,300 bbls. a day after acidizing, the entire output being taken by independent refining interests. Commoil No. 1, LSD 15, same section, with natural production around 1,200 bbls., has run tubing and is waiting for acid. Granville Oils No. 1, LSD 16, with a potential of 408 bbls. a day, has been acidized and shows some increase in production.

Output of Discovery Well

Turner Valley Royalties No. 1, LSD 13, section 28-18-2w5, completed on June 16, 1936, as the first definite crude producer on the west flank, had produced approximately 400,000 bbls. up to October 31, 1937, representing a gross revenue of $612,000. Production started around 900 bbls., natural flow, but after acidization for a time exceeded 1,200 bbls. a day, and is now officially rated at 826 bbls., potential. The well cost approximately $138,000 to drill.

Tests in the Lime

In West Central Turner Valley, Brown Oil Corp. No. 3, LSD 15, section 19-19-2w5, got the Madison limestone at 6,335 feet and cemented casing at 6,340 feet. Location is 5 miles northwest of Turner Valley Royalties No. 1 well and approximately 4 miles from the nearest crude producer in the west flank area. It is due west of section 20-19-2w5, famous for the prolific naphtha wells drilled by the Home Oil Co. some 10 years ago. The Calmont, Kermac and Mar Jon companies are participating with Brown Oil Corp. in the test, which may result in a material extension of the proven crude area.

Farther south on the west flank, West Flank Oil Co. No. 3, LSD 8, section 32-18-2w5, is below 6,870 feet, after getting the Madison limestone at 6,429 feet, and should be the next producer.

Richland Royalties No. 2, LSD 5, section 28-18-2w5, is below 6,550 feet after getting the Madison at 6,410 feet.

In section 20-18-2w5, Sunset Oils No. 1, LSD 10, which got the Madison at 7,017 feet is below 7,453 feet, and nearing completion.

North Turner Valley

In North Turner Valley, Royalite Oil Co. No. 29 Turner Basin, LSD 7, section 27-20-3w5, is below 6,195 feet after some caving trouble. Phillips Royalties No. 1, LSD 16, section 16-20-3w5, is finishing a sidetracking job at 4,120 feet.

Royalite Starts Test

In section 32-18-2w5, Royalite Oil Co. is working on cellar for No. 30 test in LSD 11. Location is about three-quarters mile west of Royalite No. 5 Sterling Pacific, which is one of the largest west flank crude producers. Acreage was subleased from Anaconda Oil Co. and the test will probably spud in January.

On the Calling Valley structure, northeast of Turner Valley, Sentinel Oil Co. No. 1, LSD 1, section 8-20-2w5, is below 6,190 feet after changing drilling line.

Potential production of Turner Valley is now estimated at 27,000 bbls. of crude and 2,000 bbls. of naphtha daily. Plans for conservation of gas now wasted in connection with naphtha production are being studied by the Alberta government.

On the Highwood-Sinclair structure, southwest of Turner Valley, Green Valley Oils No. 1 Banner, LSD 6, section 34-17-3w5, is in the Lower Dalhousie formation below 4,760 feet, and expected to get the Madison limestone around 5,000 feet. Two gas shows were recently cemented off.

On the Watson structure, Mar Jon Oil Co. has arranged for completion of its No. 3 well, LSD 3, section 4-10-2w5, standing for several months at 5,520 feet .

Taber Field

In the Taber field, southern Alberta, Plains Petroleum Corp. No. 3, section 25-9-17w4, cemented 6⅝-inch casing on top of the Clancey sand at 3,205 feet, where good oil and gas shows were met. It is now drilling into production. Plains No. 2. LSD 11, same section, is rated a fair commercial producer, with 2,000 bbls. in storage awaiting shipment.

East-Central Alberta

On the Battleview anticline, east-central Alberta, Pacalta Oils No. 1, LSD 3, section 5-48-5w4, is below 1,800 feet in the Zebra shale marker above the Viking sand. Considerable gas was met in three horizons at 434, 1,420 and 1,620 feet. Altoba Gas & Exploration Co. No. 2, section 35-47-7w4, on the westerly nose of the structure west of Battleview No. 1 gasser, is below 1,750 feet and shut down waiting for a core barrel. It is 16 feet in the sand, after getting the Lower Cretaceous contact 35 feet lower than Battleview No. 1. South End Petroleums No. 1, LSD 10, section 32-47-5w4, is spudding. Battleview Oils No. 2 has derrick up.

In the Ribstone field, Dina Oil & Refining No. 4, LSD 13, section 9-45-1w4, is preparing to run 6-inch casing before resuming from 1,150 feet. Dina No. 1 is pumping around 40 bbls. a day.

Ontario Drilling

In the Chatham Township field, Kent County, Ontario, Union Gas Co. No. 17, Lot 28, Baldoon, Dover Township, has drilled into water around 1,800 feet and will likely be abandoned. Location was about 3 miles west of the small gassers in Chatham Township.

Here's the New MARSHALLTOWN Drilling Rig Gauge Panel

This new Marshalltown Drilling Rig Gauge Panel is portable and illuminated. It protects the gauges from the heat of the boilers, the vibration of the pumps, as well as corrosion by the elements. Live steam cannot reach the gauges because of the water leg in the piping. Test gauge connections are installed on the board. Flexible connections allow for quick installation. Stirrups provide for 2" iron pipe standards.

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In the "plain English" of John Q. Public, if an engine burns heavy fuels . . . injected cold . . . it's a "Diesel." Let the technical man quibble and limit the term to high pressure compression ignition engines . . . "So what?" says this tool pusher. "I know what I want."

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Spark plug ignition starts a Hesselman easier than a gasoline engine because compression pressures can be moderate.

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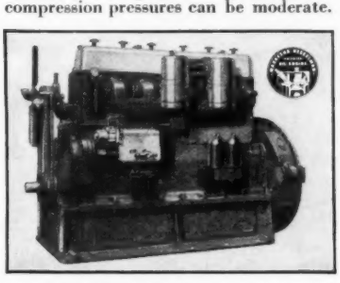

Aren't all these advantages—easiest starting, snappy performance, safe working pressures, and low up-keep—worth more than a few additional gallons of 7¢ fuel oil a day? Waukesha-Hesselman Oil Engines show the *greatest over-all economy*. Actual records of their operation over thousands of hours prove it. The whole story is told in Waukesha Engineering News Record No. 5—write for a copy.

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WAUKESHA ENGINES

QUESTIONS ON TECHNOLOGY

By Charles K. Francis, Ph.D., Technical Editor

Flash Distillation Involved in Determining Pump Efficiency

In connection with figuring the necessary head on the suction for refinery pumps, 25 pounds suction, 25 pounds vapor pressure, 115° F. temperature, one-half of 1 per cent flash with 1 pound drop in pressure, are the conditions. What does one-half of 1 per cent flash mean?—C. P. D.

The first meaning of flash in the petroleum industry is flashpoint, which is a temperature observation, stated in degrees Fahrenheit. It is unfortunate that some refiners are making use of the word in connection with fractionation or distillation.

Flashing is a form of distillation which is used for operations in which the complex mixture of hydrocarbons, after being heated above its initial boiling point, is discharged into a zone where the separation of vapors from the residual can occur. This operation may be divided into two classes: One in which the oil is heated under pressure with little or no vaporization and is then released into a separating chamber where the heat of vaporization is the sensible heat in the oil itself; and in the second vaporization occurs in the heating zone and is nearly completed when the oil enters the separator. This explanation is from the article by Permoor and Loomis.

The meaning of the condition mentioned in the question is, therefore, one-half of a per cent of the oil passes into the vapor phase at 115° F. with 1 pound drop in pressure.

For a detailed discussion of flash distillation see the reference.

Reference: Permoor and Loomis, Chem. Met. Eng., 36, 472, 1929.

Market Price of Mexican Oil

The price mentioned in The Oil and Gas Journal for heavy Mexican, Panuco, crude oil is presumed to be the New York market. Is this correct?—W. S. B.

The price quoted in The Oil and Gas Journal for heavy Mexican crude oil is the spot market price in United States currency, net per U. S. barrel, f.o.b. ship, at the Mexican port.

Gravity As Used In the American Petroleum Industry

Does 40-gravity oil mean that a volume of oil is four-tenths as heavy as an equal volume of water? Does the gravity of crude oil increase with the gasoline content? Is there any natural gasoline in low gravity oil? —L. M. B.

The gravity system commonly used in the petroleum industry is related to the hydrometer originally devised by Baume for liquids lighter than water. This is a hollow glass instrument, with bulb and stem, weighted at one end to cause it to float upright. Baume arranged an arbitrary system, selecting as the base the point to which the stem would sink in water; this he designated 10, with the numbers increasing as the specific gravity decreased. There is a definite relation to specific gravity. The American petroleum industry uses a slight modification of the Baume system, the gravities being designated A.P.I. degrees, because the scheme was adopted by the American Petroleum Institute.

An oil of 40 degrees A.P.I. has a specific gravity 0.8251, which weighs 6.874 pounds per gallon, as compared with 8.33 pounds for water.

In most instances the A.P.I. gravities of crude oils do increase with the gasoline content, however, this is not always true. It is possible for a 35-degree oil to contain less gasoline than a 30-degree oil. Usually the very low gravity oils do not contain gasoline, and when a small quantity is present, it is likely to be relatively heavy, so not suitable for motor fuel until properly blended.

Pipe Line Transporting Gas From Texas Panhandle Field

Information is desired covering the pipe lines transporting natural gas from the Texas Panhandle including—name, volume handled and where delivered? What is the area of this field?—B. L.

There are nine important gas pipe lines transporting natural gas from the Texas Panhandle. These are shown, together with volume and delivery points in the table.

PANHANDLE PIPE LINES

Company*—	Daily vol. M.C.F.	Transported to:
Canadian River Gas	54,565	Denver
Cities Service Gas	105,601	Okla., Kans., Mo., Neb.
Consolidated Gas	19,400	Oklahoma
Lone Star Gas	21,500	Okla. and Texas
Northern Texas Utilities	17,133	Texas
Northern Natural Gas	56,000	Several northern states
Panhandle Eastern Gas	48,000	Several northern states
Texoma Natural Gas	207,000	Chicago
West Texas Gas	14,500	Texas

*Add this word to each.

The Panhandle field extends in a southeast-northwest direction cutting diagonally across Moore, Potter, Hutchinson, Carson, Gray, Wheeler, Collingsworth counties and a small portion of Hartley County, Texas. It is about 124 miles long and 20 miles wide.

Reference: Railroad Commission of Texas, Annual Report on the Panhandle Oil and Gas Field, August, 1937.

CHEMICALS FOR THE PETROLEUM INDUSTRY

Ethyl Ether
(Ether)

Use—Solvent for oils, fats and waxes.

Form—Flammable colorless liquid; strong ethereal odor.

Formula—$C_2H_5.O.C_2H_5$.

Specific gravity—0.7146.

Freezing point—94° F.

Boiling point— —177° F.

LIMITATIONS

Color	Free from color
Specific gravity	0.715 to 0.718 at 68° F.
Acidity	Max. 0.002% as acetic
Boiling point	93° to 99° F.

Waterman Method for Determining Type of Hydrocarbon Groups in Lubricating Oil

We have a very brief reference to a Waterman determination of the aromatic, naphthenic and paraffinic groups in lubricating oil. Could you furnish us with a description of this method?—E. Y. L.

The basis of the Waterman method is to determine the content of aromatic rings, naphthenic rings, and paraffinic chains regardless of whether free paraffins or side chains. The first procedure is to completely hydrogenate the oil with nickel catalyst; the product contains only naphthenes and paraffins. The quantity of hydrogen absorbed and the rise of aniline point represent a measure of the original content of aromatic rings. Molecular weight, specific gravity, refractive index, and aniline point are determined on the completely saturated oil. The specific refraction as calculated by the Lorenz-Lorentz formula, gives a measure for the ring content, so that the proportion of saturated rings to paraffin chains is established from physical constants. However, the composition of a saturated oil would be different according as the presence of five-membered, six-membered, or noncondensed systems is assumed. To illustrate: Waterman investigated an oil whose molecular weight was 388, specific gravity 0.8705, and refractive index 1.4787. He found that if the rings were five-membered, they would form 35 per cent of the oil; if six-membered, 42; if condensed five membered, 22, and if condensed six-membered, 30 per cent. In his calculations he assumed condensed six-membered systems which was probably correct since the hydrogenation of aromatic hydrocarbons usually results in this class of compounds. Hence the only arbitrary assumption made was that the original naphthenes in the oils were six-membered rings.

It is not necessary to completely hydrogenate. From the physical properties it is possible to determine those of the fully saturated oil. Waterman drew up a diagram showing the relation between molecular weight, specific refraction, and aniline point.

An oil had a molecular weight of 387 and aniline point of 81.4° C. According to the diagram of aniline point for an oil with specific refraction 0.3294 would be 109.6° C. (109.6—81.4) 0.8 = 22.6, also 22.6 + 81.4 = 104° C. Referring on the diagram to molecular weight 387 and aniline point 104°, the corresponding specific refraction is 0.3237. The specific refraction of pure paraffins of the same molecular weight is 0.3334, that of six-membered condensed naphthenic rings is 0.3073. Then

$$\frac{0.3334-0.3237}{0.3334-0.3073}\times 100 = 37 \text{ per cent},$$

the sum of the saturated and the aromatic rings. To arrive at the content of aromatic rings: It has been found that aniline point increases 1° C. for every 0.85 per cent of aromatic rings; 22.6 × 0.85 = 19 per cent of aromatic and 37 — 19 = 18 per cent of naphthenic. This leaves, by difference, 63 per cent of paraffinic chains.

Reference: Abstracted from Library Bulletin Abstracts, XII, 121, 1937 Original ref. Waterman, Analysis of Lubricating Oils, Petrol. Zeit. 33, No. 7, Motorenbetrieb und Maschinen-Schmierung, 2, Feb. 17, 1937.

MARKET RECORD, ACTIVE OIL STOCKS

Compiled by Carl H. Pforzheimer & Co., 25 Broad Street, New York City, Member New York Stock Exchange and New York Curb Exchange

New York Stock Exchange

1937 High	1937 Low	Week ending Dec. 24 Sales	High	Low	Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1936	1936 High	1936 Low	1935 High	1935 Low
114⅞	51½	6,400	65	60	60	Amerada Corp.	788,675	N.P.	50cQ	10-30-37	$2.00	125½	75	80	48⅛
37	18	11,300	20¾	19¼	19¼	Atlantic Refining	2,664,000	$25	25cQ	12-15-37	1.25	35⅛	26⅝	28	20⅛
43⅜	10⅛	3,000	18⅛	16⅝	17	Barber Co.	387,149	$10	75c	12-16-37	.50	38½	21	22½	11⅜
35¼	10	9,700	14⅜	13½	14	Barnsdall Oil Co.	2,247,974	$5	25cQ	11-1-37	.80	28¼	14⅛	14¾	5⅞
17⅞	7	25,500	9⅜	9	9⅛	Consolidated Oil Corp.	13,919,417	N.P.	20cQ	2-15-38	.80	17¼	11½	12¼	6½
40	24	22,100	32⅛	30¼	31½	Continental Oil of Delaware	4,682,615	$5	25cQ	12-20-37	1.50	44⅞	28⅛	35	15⅛
17⅝	4¾	8,000	7¼	6¾	6¾	Houston Oil (new)	1,098,618	$25	....	10-17-30	....	13⅞	6⅜	7	1½
35⅜	14	6,300	20¼	19¼	19½	Mid-Continent Petroleum	1,855,912	$10	$1	21-1-37	1.15	30⅞	17¼	20½	9½
34	15⅜	3,200	16	15⅜	15¾	Mission Corporation	1,399,345	N.P.	25c	12-24-37	.45	29⅞	16¾	17¾	10⅜
26¼	19¼	15,300	21⅞	20	21⅝	National Supply	382,591	$25	$2 pf.‡	12-22-37	....	75½	19⅞	20⅞	9
22⅞	9	19,700	13¾	13⅛	13⅜	Ohio Oil Co.	6,563,377	N.P.	50cSA	12-15-37	.60	18	12⅛	14¼	9¼
29¾	12⅛	2,100	13⅜	12⅜	12½	Pacific Western Oil	1,000,000	N.P.	65c	12-18-36	.65	23½	11¾	14	6¾
17⅛	7	No sales	..	..	..	Pan American Pet. & Trans.	4,702,945	$5	$1*	12-21-37	.60*	20⅝	12¼	21	10¾
64	30⅛	24,100	41⅜	39¼	40	Phillips Petroleum	4,449,052	N.P.	75cQ†	12-1-37	2.50	52⅜	38⅛	40	13¾
29⅞	13	6,300	18¼	17⅞	18	Plymouth Oil Co.	1,050,000	$5	35cQ	9-30-37	.90	27¾	11⅞	13	6⅛
24⅝	8¾	48,600	12¼	11¼	11¾	Pure Oil Co.	3,281,120	N.P.	25c	12-1-37	....	24⅞	16	17	5⅞
6½	4⅛	20,000	5⅝	5⅜	5½	Richfield Oil Corp.	3,986,638	N.P.	25c	12-24-37	....	..	..	..	..
54⅛	16	4,300	24	21⅞	21⅞	Seaboard Oil of Delaware	1,224,283	N.P.	25cQ	9-15-37	1.00	44	30½	36⅞	20⅝
34⅜	14⅞	4,900	18⅛	17¼	17⅜	Shell Union Oil	13,070,625	N.P.	50c	12-20-37	.25	28¼	14⅜	16½	5⅛
60⅝	26⅞	2,800	32⅝	30	30	Skelly Oil	1,006,348	$15	50c	9-30-37	....	47⅜	19½	20½	6⅛
23¼	13	40,600	15¾	15⅛	15⅝	Socony-Vacuum	31,151,071	$15	30c	12-15-37	.70	17½	12½	15¾	10⅝
50	28	27,400	30¼	28⅞	28⅞	Standard Oil of California	13,014,754	N.P.	80cQ†	12-15-37	1.20	47⅝	35	41⅛	27⅝
50	26½	12,200	35¼	34¼	34¾	Standard Oil (Indiana)	15,196,241	$25	$1Q†	12-15-37	2.40	48½	32¾	33⅜	23
43	30⅝	No sales	..	..	..	Standard Oil of Kansas	134,841	$10	$5	12-20-37	1.00	31	25	32	20
76	42	52,200	47⅛	45⅝	46	Standard Oil of New Jersey	25,856,081	$25	$1.25SA†	12-15-37	2.00	70⅜	51⅛	52⅜	35⅜
77½	44½	1,800	49	45⅞	49	Sun Oil	2,156,825	N.P.	25cQ	9-15-37	$1 & 6% Stk.	91	70	77	60⅛
7¾	1½	5,100	2⅝	2½	2½	Superior Oil Corp.	1,388,079	$1	....	....	....	6¾	3	3½	1⅝
65¼	34⅜	43,800	43	40⅝	41½	Texas Corp.	10,896,858	$25	50cQ	1-2-38	1.50	55¼	28⅞	30¼	16⅛
9⅝	2	5,000	4	3¾	3¾	Texas Gulf Producing Co.	888,134	N.P.	10c	12-23-37	.05	8⅞	4⅜	4¾	2⅛
16⅝	5⅜	6,000	8½	8⅛	8¼	Texas Pacific Coal & Oil	888,237	$10	10c	12-1-37	.25	15¼	7½	9¼	3⅛
21⅝	13⅛	8,600	15⅞	15	15	Tide Water Associated	6,288,512	N.P.	15c Spl.	12-17-37	.70	21¾	14¾	15⅞	7⅝
28¼	17½	4,500	19¾	18⅞	19	Union Oil of California	4,386,070	$25	55cQ†	11-10-37	1.00	28½	20¾	24	14⅝
31½	22	200	22⅞	22⅝	22⅞	Union Tank Car Co.	1,200,000	N.P.	40cQ	12-1-37	1.20	31⅝	22⅝	26½	20⅞
6¼	1¾	900	2½	2¼	2¼	Wilcox Oil & Gas	424,839	$5	....	5-10-28	....	5¼	2⅜	3⅛	1

*Payable in 3½% notes. †Includes extras. ‡One-tenth share $2 preferred stock.

New York Curb Exchange

1937 High	1937 Low	Week ending Dec. 24 Sales	High	Low	Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1936	1936 High	1936 Low	1935 High	1935 Low
10	6⅝	7,300	9¾	8	9	American Republics Corp.	1,308,049	$10	30c	12-27-37	....	..	..	..	..
21⅜	7	3,900	9⅞	9⅜	9⅞	Bridgeport Machine Co.	260,000	N.P.	1.25	12-30-37	$1.00	21	13¼	14⅛	3⅜
51½	37¼	150	38½	36	36	Buckeye Pipe Line Co.	200,000	$50	75cQ	12-15-37	3.25	50	39¾	42½	30⅛
123	95½	450	101	99	101	Chesebrough Mfg. Co.	120,000	$25	$1.50Q†	9-30-37	7.00	124¾	105	157	115
5⅜	1½	32,800	2⅛	2	2	Cities Service	37,804,394	N.P.	....	6-1-32	....	7⅜	3	3¼	⅝
5½	1½	5,200	2	1⅝	1¾	Cosden Petroleum	399,687	$1	....	.....	....	4½	1½	1½	⅛
38¾	20¼	6,500	24¾	24	24¼	Creole Petroleum	6,974,356	$5	50cSA†	12-15-37	.50	39	19⅞	23¾	10
18⅝	6½	800	8⅛	7⅝	8⅛	Darby Petroleum	351,390	$5	25cSA	1-15-38	.50	18⅛	9	8⅞	4
8⅜	2¼	400	3⅜	3⅛	3¼	Derby Oil & Refining	263,162	N.P.	....	.....	....	6¾	1⅞	2	⅝
47½	24½	100	28	27	27	Eureka Pipe Line	50,000	$50	$1Q	11-1-37	4.00	47½	38½	38	33¼
63½	33	8,200	38⅝	37⅜	38	Gulf Oil Corp.	9,076,202	$25	25cQ	12-1-37	1.50, 100% Stk.	59	36	74¾	50⅛
87	54⅞	5,500	68⅝	64¼	68	Humble Oil & Refining	8,923,935	N.P.	62½cQ	12-27-37	1.50	80	57	64	44
24¼	14½	4,300	17⅞	17½	17½	Imperial Oil of Canada	26,919,871	N.P.	62½cSA‡‡	12-1-37	1.25	24½	19¾	22½	15⅝
15	5⅞	100	8¼	8¼	8¼	Indiana Pipe Line	300,000	$10	50cSA	11-15-37	.80	9¾	5½	6⅛	3⅝
39½	23½	3,600	28⅞	28⅜	28½	International Petroleum	14,247,088	N.P.	$1.25††‡	12-1-37	2.50	39⅝	32⅝	39¾	28
8¾	2⅜	1,700	3	2⅝	2⅝	Kirby Petroleum Co.	500,000	$1	10c	9-15-37	.20	5¾	2⅝	3	1⅞
34	12½	4,900	18⅝	18	18½	Lion Oil Refining	270,000	N.P.	50cQ†	12-24-37	.75	17¾	7⅜	8⅛	3⅛
14¼	5¼	5,200	7½	7⅛	7¼	Lone Star Gas	5,382,723	N.P.	20c	12-22-37	.60	14¼	9⅞	10⅞	4½
15¼	6¾	10,400	9¼	8¼	8⅜	Louisiana Land & Exp.	3,000,000	N.P.	20cQ†	12-15-37	.50	15⅜	9⅞	11⅜	4⅜
14⅝	6¼	2,200	7⅛	6⅞	7	Midwest Oil Co.	998,444	$10	50c	12-15-37	....	....	..	..	..
7⅞	4⅛	700	4¾	4½	4¾	Mountain Producers	1,682,182	$10	30cSA	12-15-37	.60	8⅜	5	5¾	4⅛
19½	12	2,100	14⅛	13¾	13⅞	National Fuel Gas	3,810,183	N.P.	25cQ	1-15-38	1.00	23	17⅜	20	11⅝
12½	7¼	700	7⅞	7½	7½	National Transit	509,000	$12.50	55cSA	12-15-37	.75	15⅜	9¼	10⅝	6⅜
5	1⅛	1,600	1⅝	1½	1½	New Mexico and Arizona	1,000,000	$1	1c	12-1-36	.01	6⅝	1⅝	2½	1
5⅜	3⅞	300	3⅞	3⅞	3⅞	New York Transit	100,000	$5	60c Spl.	12-28-37	.35	6¼	4¼	4⅞	3
12¾	5¾	No sales	..	..	..	Northern Pipe Line	120,000	$10	25cSA	12-1-37	.40	9¾	4⅞	8	5⅛
9⅝	2¾	33,300	5⅞	5⅜	5¾	Pantepec Oil	1,608,700	N.P.	....	.....	....	10⅛	3¼	4⅜	1¼
13¾	2	900	3⅛	2⅞	2⅞	Root Petroleum Co.	336,045	$1	25c	2-1-37	.50	19¼	4½	5	1⅛
6½	2¼	2,200	3½	3⅛	3¼	Ryan Consolidated	296,931	N.P.	....	.....	....	4¾	1⅞	2½	⅝
7¼	3⅞	200	4⅛	4⅛	4⅛	Southern Pipe Line	100,000	$10	25cSA	9-1-37	.25	7⅞	3¼	5	3⅞
56	35	900	39	38	38	South Penn Oil	1,000,000	$25	$1.15Q†	12-28-37	2.60	44	32½	34½	21⅝
42	20	No sales	..	..	..	South West Penna. Pine Lines	35,000	$50	50cQ	12-31-37	13.00	60	44	56	44¼
21⅛	14¾	1,100	18	17½	18	Standard Oil of Kentucky	2,604,790	$10	40cQ†	9-15-37	1.35	23⅜	17⅛	24	18
13¾	8	1,400	9	8⅞	8⅞	Standard Oil of Nebraska	188,403	$25	25c	3-29-37	.25	14⅝	11	12	7⅞
45	16	1,000	22⅜	20½	20½	Standard Oil of Ohio	753,740	$25	75cQ†	12-15-37	2.00	40	21¾	23⅝	11½
4⅛	2	2,000	3	2⅞	3	Sunray Oil	1,910,119	$1	10c	12-24-37	.10	5	2⅝	2⅞	⅞
7⅝	2	700	4	4	4	Texon Oil & Land	336,028	$2	15cQ	1-3-38	.60	9¾	5⅝	6⅞	5
13⅝	3	14,800	5	4½	4¾	United Gas Corp.	7,818,959	$1	10c	9-15-37	.20	10¾	4	4⅞	⅞

†Includes extras. ‡Payable in Canadian funds.

Note—In comparing highs and lows for the several years in the two tables, it will be necessary to take into consideration cases where there have been stock split-ups.

PERSONAL PARAGRAPHS

E. G. L. Smith, formerly purchasing agent for the Kettleman North Dome Association of California, has joined the purchasing department of the General Petroleum Corporation, Los Angeles.

H. E. ELLIS, superintendent for the George F. Getty interests, and stationed in Ventura, Calif., has been placed in charge of his company's part in developing the 11,300-foot Rio Bravo reservoir.

C. H. LIEB, former president of the Carter Oil Company, was honor guest Wednesday evening of this week at a party given by his associates at the Tulsa Club, on the eve of his departure from Tulsa for New York, where he is to serve as an executive in the production department of the Standard Oil Company of New Jersey. About 35 officers and department heads of the Carter were present. Mr. Lieb is succeeded as president by J. J. CONRY, former vice president.

R. G. A. VAN DER WOUDE, president of the Shell Union Oil Corporation, sailed from New York December 23 for a combined business and pleasure trip to Europe.

R. E. ADAIR, formerly petroleum engineer with the Texas Railroad Commission, has resigned to join the engineering staff of the American Liberty Oil Company. He will remain in the Rodessa field where he was stationed with the commission.

FRANCIS W. RICKETT, British operator, who in 1935 obtained sole rights for development of Ethiopian oil and mineral resources and assigned them to the Standard-Vacuum Oil Corporation, arrived in this country from England last Thursday. He denied that his visit was for resumption of negotiations for Ethiopian oil development. Standard-Vacuum's participation in the original deal was rescinded.

PROF. H. A. EVERETT, of the department of mechanical engineering, Pennsylvania State College, has returned after several months in Europe. He presented a paper at the international lubrication conference in London.

W. W. SOLLENBERGER, attorney for the Standard Oil Company of New Jersey subsidiary in Mexico, the Huasteca Oil Company, arrived in New York last week by plane to discuss provisions of the recent Mexican labor board decision raising wage scales and increasing social costs.

J. F. FABER, who retired last week as refinery superintendent for the Standard Oil Company of California at Bakersfield after 35 years with the company, was the guest of honor at a dinner in Bakersfield attended by 64 officials and employes. Among those present was A. S. RUSSEL, from San Francisco, a member of the board of directors.

R. M. BEATTY, district geologist for the Tide Water Associated Oil Company, in Corpus Christi, Tex., has resigned to become associated with the Trinity Oil Company.

ELIJAH A. PASCHAL, with the Coline Oil Corporation, was elected president of the Oklahoma City Geological Society last week. DAN O. HOWARD, with the State Corporation Commission, is vice president, and R. B. BRUCE CURRY, Carter Oil Company, secretary-treasurer.

JIMMIE CHISHOLM, Pure Oil Company, Houston, Tex., was elected president of the Gulf Coast chapter of the National Oil Scouts Association. BILLY MATHEWS, Arkansas Fuel Oil Company, Houston, was elected vice president, and ED DILLEY, Atlantic Refining Company, secretary and treasurer.

EDWARD O. KOESTER, district geologist for the Darby Petroleum Corporation, was chosen president of the Kansas Geological Society at the annual election in Wichita. GLEN C. WOOLLEY, Transwestern Oil Company, was named vice president and FORREST WIMBISH, secretary-treasurer. GEORGE H. NORTON, division geologist for the Atlantic Refining Company, was elected to the board of directors.

JOHN A. McCUTCHIN will become chief petroleum engineer for the British American Oil Producing Company January 1. He joined the British American last November as a petroleum engineer. Mr. McCutchin received his B. S. degree in engineering geology, his professional degree as "engineer of mines" and his M. S. degree in engineering from the University of Oklahoma. Mr. McCutchin succeeds VAN D. BENNETT, who resigned to become chief consulting engineer of the Sunray Oil Company.

Do You Remember?

From The Oil and Gas Journal Files

25 YEARS AGO

Mrs. John Eaton, widow of one of the founders of the Oil Well Supply Company, dies in New York. Mrs. Loretta Beatrice Fancher, wife of a prominent Oklahoma oil producer, A. T. Fancher, dies at the family home in Salamanca, N. Y.

Oklahoma oil fields are frozen in with the temperature several degrees below zero. Tulsa suffered from a gas shortage, frozen water lines and no electric light service.

20 YEARS AGO

American oil men in Tampico are kicking at the high cost of living there. Ham is $1.25 per pound; beef steak, $1 per pound; milk, 40 cents per quart; eggs, 10 cents each. Rents, clothing and other necessities are correspondingly high.

Jake L. Hamon, of Ardmore, Okla., is the largest individual oil producer in Oklahoma. His wells produce close to 10,000 barrels a day.

E. W. Colling, veteran pipe liner, and a director in the National Transit Company and other corporations, dies in Oil City, Pa.

10 YEARS AGO

A tract of land eighty-five-hundredths of an acre in the Jennings field, Evangeline Parish, Louisiana, is credited with a crude oil production of 4,235,115 barrels from five wells drilled between the years 1904 and 1912. All had quit producing by 1920. The sand is between 1,600 and 1,700 feet in depth and lies between two highs, virtually in a syncline.

Dr. J. C. W. Bland, who, with Dr. Fred S. Clinton, drilled the first well in the Tulsa district in 1901, dies in Tulsa. The well was a small producer at about 600 feet.

The Seminole field, with a peak of 527,400 barrels on July 30, 1927, has fallen off 40 per cent at the close of the year.

ALBERT W. WEEKS, geologist for the Shell Petroleum Corporation in the Wichita Falls district, has been elected president of the North Texas Geological Society, Wichita Falls.

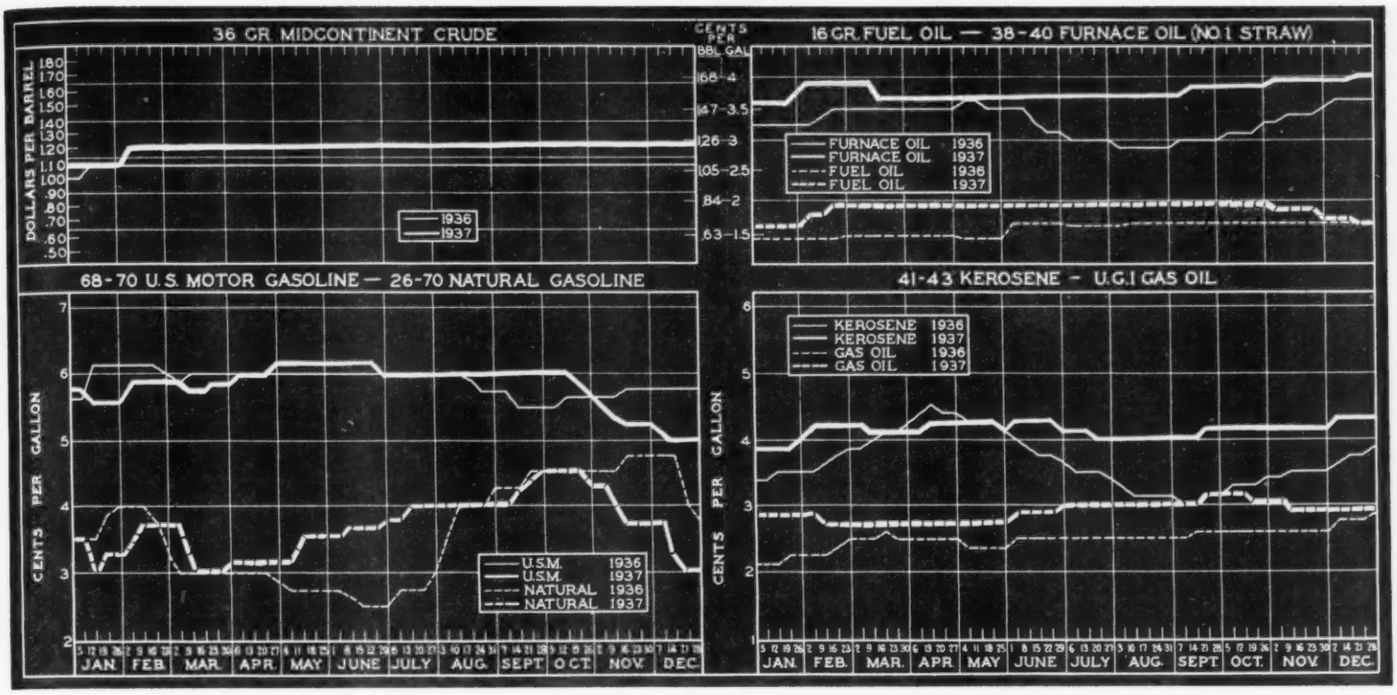
R. H. EVANS, general manager of the Socony-Vacuum Oil interests in Central Europe, has been awarded the Offizierskreuz des Oesterreichischen Verdienstordens (Officers Cross of Order of Merit) by the Austrian government, a high distinction.

GUY A. HANNUM, landman for the Transwestern Oil Company, Oklahoma City, has announced he will retire January 1. Mr. Hannum was in the service of the late Tom B. Slick for years, and was carried through with several organization changes.

WALLACE A. BELSTROM, vice president of the Mills Bennett Production Company, Houston, Tex., has resigned. He will spend the next 30 days on vacation at his former home in Minnesota, following which he will return to Houston.

ARTHUR B. ALLYNE, chairman of the Pacific Coast Gas Association's technical section, resigned from the Southern Counties Gas Company's organization to become associate engineer for the California Railroad Commission with headquarters in San Francisco.

JUDGE AMOS L. BEATY has moved his home from New York to Houston, Tex., where he will take active charge of Amos L. Beaty Company, Inc. Judge Beatty formerly was president of the American Petroleum Institute and was president and board chairman of the Texas Company. The company which he now heads is interested in production in the Manvel field and Ector County, and holds leases in other Gulf Coast spots.



Representative Mid-Continent Quotations on Crude Oil and Refined Products, Basis Oklahoma (Group 3)

Light Heating Oils and Naturals Offer Bright Spots in Refinery Market

Light heating oils were the center of buying interest among oil products as the year neared its close, and these, with activity in natural gasoline, provided cheery spots in an otherwise drab market.

Mounting stocks of gasoline and the high rate of refinery operations continue to evoke expressions of concern. There is a growing feeling that it is fatuous to expect summer consumption of 1938 to take care of the huge inventories piling up. The same thing was expected in 1937. There was record-smashing consumption, but in spite of it refiners entered upon the fall season with an oppressive load of leftover gasoline.

Many refiners are sold up on distillate fuel oil for January, and if their output should fall short of the requirements of jobber customers, inquiries for material in a tight spot market might easily shove quotations to new high ground. In the Mid-Continent territory No. 2 straw was particularly scarce. The call for No. 1 prime white and No. 2 dark was hardly less insistent.

Heavy Drafts on Fuel Stocks

On the East Coast deep drafts have been made this month on fuel stocks held by refiners and distributors, but the heaviest drain is expected during the next two or three months. Further improvement was reported in the No. 2 tank-wagon fuel oil market, with most of the business transacted at 7½ cents a gallon.

With the 26-70 grade of natural gasoline selling at 3 cents in both Oklahoma and Texas, a spurt in jobber buying was witnessed, since this puts stabilized material in competition with the refinery product and enables the buyer to get a high-octane motor fuel at a low-octane price. The 14-pound was going to the trade at 4 cents and the 12-pound at 4¼. Octane ratings ranged from 65 to 75, with 70 as a fair average. In northern areas this stabilized material is used straight, but in warmer regions it is the practice to blend it with naphtha. Orders, manufacturers said, were for immediate delivery. Chart followers point out that both natural and refinery gasoline are about three-quarters of a cent lower than they were in the corresponding period last year.

Motor fuel, observers said, was slightly firmer than last week, though it must have taken delicate recording instruments to discover that. In the Mid-Continent some of the large companies were buying from small refiners. The purchases were largely low-octane material. There was substantial buying for delivery after the first of the year, but refiners reported many orders too from buyers who had allowed their stocks to run low and who asked for immediate delivery.

On the Atlantic seaboard gasoline was holding fairly steady at the levels to which it has settled in the past six weeks. Shipping instructions against previously placed contracts are maintaining their lead of about 10 per cent beyond the business recorded at the same period in 1936. Tankcar prices are generally 7½ cents a gallon for house-brand gasoline for the New York trade, with northern New Jersey quotations a quarter-cent lower. Most of the 65-octane gasoline moving in the open market is turning currently at 7 cents in New York, with fractionally lower prices for barge delivery there and in the Philadelphia and Baltimore areas.

The market reports for Group 3 and the East Coast are combined this week. Separate reports will appear as usual in the issue of January 6. Owing to the Christmas holiday some oil statistics customarily given are not available.

Kerosene Strong

Kerosene was exhibiting increased strength, with prices stiffening, in the Group 3 area. It was in brisk demand on the Gulf Coast. Lubricants were slow in all areas. Bright and dark cylinder oils in western Pennsylvania have apparently levelled off at prices prevailing during the preceding week, and suppliers say the existing dullness should not last more than another month or so. Wax was lifeless, with quotations unchanged.

Bunker C fuel oil was steady at $1.25 a barrel in northern Atlantic ports and 95 cents in extreme southern Atlantic and Gulf Coast ports. There is no material rise in heavy-oil consumption by manufacturing plants, but the steamship and power company demand is holding at fairly high levels. Consumption by the shipping industry is particularly steady for this season of the year, and with favorable weather conditions may be expected to exceed all previous records throughout the winter.

Refined Oil Market Barometer

MID-CONTINENT. Heating oils buoyant. Naturals in active demand. Gasoline unsteady.

EAST COAST. Light fuels vigorous. Gasoline holding fairly well. Kerosene firm.

GULF COAST. Gasoline weak. Light fuel oils and kerosene firm.

CALIFORNIA. Fuel oil prices reduced. Market generally little changed.

PENNSYLVANIA. Fuel oil and kerosene strong. Gasoline weak. Lubricants weak.

CHICAGO. Light burning oils vigorous. Gasoline consumption heavy, but prices unsteady.

RETAIL OIL MARKETS

Tank-wagon and filling station prices on gasoline and kerosene furnished by the larger marketing firms

Prices of December 28, 1937

Taxes

The gasoline quotations given in the following tables include the 1-cent federal tax, as well as state, county and city taxes. The gasoline is the regular or standard grade. In most areas a third grade and a premium grade are also available.

Standard Oil Co. (Indiana)

	Gasoline Tank wag.	Gasoline Dlr.	Gasoline Inc. tax	Kero. tank wag.
Chicago, Ill.	15.3	13.3	4.0	10.2
Decatur	15.3	13.8	4.0	10.2
Joliet	15.3	13.8	4.0	10.2
Peoria	15.3	13.8	4.0	10.2
Quincy	15.1	13.6	4.0	10.0
Davenport, Ia.	15.3	13.8	4.0	‡13.2
Des Moines	15.1	13.6	4.0	‡13.0
Mason City	15.4	13.9	4.0	‡13.3
Sioux City	15.3	13.8	4.0	‡13.2
Duluth, Minn.	17.0	15.5	5.0	10.9
Mankato	16.7	15.2	5.0	9.5
Minneapolis	16.7	15.2	5.0	10.6
Lacrosse, Wis	16.7	15.2	5.0	10.6
Green Bay	17.0	15.5	5.0	10.9
Milwaukee	16.5	15.0	5.0	10.4
Detroit, Mich.	15.1	13.6	4.0	9.8
Grand Rapids	16.3	14.8	4.0	11.0
Saginaw	16.1	14.6	4.0	9.1
Evansville, Ind.	16.8	15.3	5.0	†10.7
Indianapolis	16.9	15.4	5.0	†10.8
South Bend	17.2	15.7	5.0	†10.2
Fargo, N. Dak.	16.7	15.2	4.0	11.6
Minot	17.9	16.4	4.0	12.8
Huron, S. Dak.	17.1	15.6	5.0	11.0
Kans. City, Mo.*	14.6	13.1	4.0	8.5
St. Louis*	14.9	13.4	4.0	9.8
St. Joseph	14.6	12.4	4.0	9.0
Wichita, Kans.	14.1	12.4	4.0	8.5

*State tax 2 cents, 1-cent city tax and 1-cent federal tax. †Does not include 4-cent state tax. ‡Iowa kerosene prices include 3-cent state tax.

(Exclusive of state general sales taxes, except Indiana and South Dakota.)

Discounts to commercial consumers: On purchases per month off tank-wagon prices: 1,000 gallons or more, 1.5 cents off; minimum delivery 25 gallons.

Stanolex Fuel Oil in Chicago

Effective Dec. 7, 1936, f.o.b. Chicago tank-wagon prices: Range oil, 1-99 gallons, 8.8 cents; 100-149 gallons, 7.8 cents; 150 gallons and over, 7.3 cents. Stanolex No. 1, 1-99 gallons, 8.8 cents; 100-149 gallons, 7.8 cents; 150 gallons and over, 7.0 cents. Stanolex furnace oil, 1-149 gallons, 7.8 cents; 150 gallons and over, 7.0 cents. Stanolex A, 1-399 gallons, 5.75 cents; 400 gallons and over, 4.75 cents. Stanolex B, 1-799 gallons, 5.75 cents; 800 gallons and over, 4.75 cents.

Atlantic Coast District

STANDARD OIL CO. OF NEW JERSEY

	Gasoline Tank wag. dlr.	Gasoline Tank car con'r.	Gasoline Inc. tax	Kero. tank wag.
Atl'tic City, N. J.	12.75	11.25	4.0	9.0
Newark	12.75	11.25	4.0	9.0
Annapolis, Md.	14.85	13.35	5.0	9.5
Baltimore	14.25	12.75	5.0	9.0
Cumberland	16.65	14.15	5.0	10.0
Wash'g'n, D. C.	12.5	11.0	3.0	9.5
Danville, Va.	17.45	14.95	6.0	12.9
Norfolk	16.25	13.75	6.0	11.5
Petersburg	16.55	14.05	6.0	11.7
Richmond	16.55	14.05	6.0	11.7
Roanoke	17.75	15.25	6.0	12.9
Charles'n, W. V.	17.05	14.55	6.0	12.6
Parkersburg	16.35	13.85	6.0	11.2
Wheeling	16.25	14.85	6.0	12.2
Charlotte, N. C.	18.65	16.15	7.0	12.6
Hickory	19.15	16.65	7.0	13.0
Mt. Airy	18.95	16.45	7.0	12.8
Raleigh	18.25	15.75	7.0	12.1
Salisbury	18.75	16.25	7.0	12.7
Charleston, S. C.	17.25	14.75	7.0	11.1
Columbia	18.25	15.75	7.0	12.1
Spartanburg	18.95	16.45	7.0	12.9

Price basis to commercial consumers, effective March 8, 1937, in Maryland, District of Columbia, and in Arlington and Fairfax counties in Virginia; and March 12 in New Jersey: To contract accounts purchasing at least one full compartment at time by hose connection, on yearly purchases: From 2,500 to 100,000 gallons, consumer tank-wagon price at time and place of delivery; 100,000 gallons per year, consumer tankcar price plus .5 cent per gallon. Consumer tank-wagon price generally will be equivalent to dealer tank-wagon price less .5-cent per gallon.

Effective May 15, 1937, in North and South Carolina, West Virginia and Virginia (except Arlington and Fairfax counties): Commercial consumers taking deliveries of 50 gallons (W. Va., 100 gallons) or more at one time will be billed at posted consumer tank-wagon price. Accounts taking deliveries of less than 50 gallons (W. Va., 100 gallons) will be billed at 4 cents per gallon over posted consumer tank-wagon price. Generally the posted consumer tank-wagon price will be equivalent to the dealer price less .5 cent per gallon.

Discount for kerosene, 1 cent off tank-wagon price for 25 gallons or more under contract (contract not necessary in Baltimore) except no discount in New Jersey

Southern District

STANDARD OIL CO. OF KENTUCKY

	Gasoline Tank wag.	Gasoline Net dlr.	Gasoline Inc. tax	Kero. tank wag.
Atlanta, Ga.	21.0	18.0	7.0	*12.0
Augusta	21.0	18.0	7.0	*14.0
Macon	21.0	18.0	7.0	*14.5
Savannah	19.0	16.0	7.0	*12.0
Birm'ham, Ala.	22.0	19.0	8.0	12.0
Mobile	22.0	19.0	9.0	11.0
Montgomery	22.0	19.0	9.0	14.5
Jackson, Miss.	20.0	17.0	7.0	*13.0
Vicksburg	20.0	17.0	7.0	*13.0
Jacksonville, Fla.	20.0	17.0	8.0	†10.0
Miami	20.5	17.5	8.0	†12.5
Pensacola	22.0	19.0	9.0	12.0
Tampa	19.0	16.0	8.0	10.5
Lexington, Ky.	19.5	16.5	6.0	11.0
Covington	19.0	16.0	6.0	11.0
Louisville	19.0	16.0	6.0	10.5
Paducah	19.5	16.5	6.0	10.0

Price basis to tank-wagon consumers: Effective January 4, 1937, 3 cents per gallon below tank-wagon price. Kerosene prices in all states subject to 2 cents discount except in Kentucky where prices are net.

*Includes 1-cent state tax. †Subject to 2-cent discount.

Montgomery, Ala., has a county tax of 1 cent per gallon, and a city tax of 1 cent per gallon on gasoline, in addition to state tax; and 1 cent per gallon on kerosene. Mobile, Ala., has a city gasoline tax of 2 cents per gallon; Birmingham, Ala., has a city gasoline tax of 1 cent per gallon; Pensacola has a city gasoline tax of 1 cent.

Rocky Mountain District

CONTINENTAL OIL CO.

	Gasoline Dealer	Gasoline Inc. tax	Kero. tank wag.
Denver, Colo.	15.0	5.0	11.5
Grand Junction	19.0	5.0	15.0
Pueblo	16.0	5.0	10.5
Casper, Wyo.	17.0	5.0	11.5
Cheyenne	16.0	5.0	13.0
Butte, Mont.	19.5	6.0	15.5
Billings	19.5	6.0	15.5
Helena	19.5	6.0	15.5
Great Falls	19.5	6.0	15.5
Salt Lake City, Utah	19.5	5.0	16.0
Twin Falls, Ida.	21.0	6.0	18.0
Boise	21.5	6.0	18.0
Albuquerque, N. M.	17.5	*6.5	12.0

*Includes city tax of one-half cent.

Ohio

STANDARD OIL CO. OF OHIO

	Gasoline Tank con'r.	Gasoline Di-vided dlr.	Gasoline Inc. tax	Kero. tank wag.
Ohio points	16.0	15.00	5.0	*13.5

*Includes state tax of 1 cent.

New York and New England

SOCONY-VACUUM OIL CO., INC.

	Gasoline Tank wag. dlr.	Gasoline Tank car con'r.	Gasoline Inc. tax	Kero. tank wag.
Albany, N. Y.	14.5	12.5	5.0	9.0
*Met. N. Y.:				
Manh't'n, Br'nx	14.5	12.5	5.0	9.0
Staten Island	14.5	12.5	5.0	9.0
Q'ns. & Brklyn	14.5	12.5	5.0	9.0
Buffalo	15.05	13.04	5.0	7.5
Rochester	15.0	13.17	5.0	8.5
Syracuse	14.5	13.12	5.0	9.5
Boston, Mass.	13.00	11.5	4.0	8.5
Portland, Me.	14.8	12.5	5.0	8.75
Manch'ter, N. H.	15.8	13.0	5.0	9.5
Burlington, Vt.	15.4	12.9	5.0	9.5

*Does not include 2 per cent city sales tax which is calculated on basis of net retail price exclusive of state and federal taxes.

Price basis to undivided dealer: Posted dealer tank-wagon price less .5 cent. Price basis to commercial consumer: Effective Nov. 15, 1936, monthly purchases of 25,000 gallons and over, consumer tankcar prices at delivery point plus .5 cent per gallon; monthly purchases of 5,000 to 25,000 gallons, undivided dealer price at delivery point; monthly purchases under 5,000 gallons, pay divided dealer tank-wagon price at delivery point.

Pacific Coast Territory

STANDARD OIL CO. OF CALIFORNIA

	Gasoline Tank wag.	Gasoline Serv. sta.	Gasoline Inc. tax	Kero. tank wag.
San Francisco	17.5	18.5	4.0	11.5
Los Angeles	17.0	18.0	4.0	10.0
Fresno, Calif.	18.5	19.5	4.0	12.5
Phoenix, Ariz.	21.0	22.0	6.0	‡17.0
Reno, Nev.	20.0	21.0	5.0	13.0
Portland, Ore.	20.0	21.0	6.0	13.5
Seattle, Wash.	20.0	21.0	6.0	13.5
Spokane	22.5	23.5	6.0	16.0
Tacoma	20.0	21.0	6.0	13.5

‡Includes 5-cent state tax.

Discounts to dealers: On gasoline, off tank-wagon price, to 100 per cent dealers, 3 cents; to split dealers, 2 cents. To commercial consumers: on tank-wagon price: on single deliveries of 40 gallons and over, advance quantity discount extended at time of delivery, 3 cents. Service station schedule applies on single deliveries less than 40 gallons. On kerosene in tankcar, transport truck and trailer delivery, 3 cents off tank-wagon price; plant deliveries to jobbers, 2.5 cents below tank-wagon.

Nebraska

STANDARD OIL CO. OF NEBRASKA

	Gasoline Tank wag.	Gasoline Dlr.	Gasoline Inc. tax	Kero. tank wag.
Omaha	17.7	16.2	6.0	10.5
McCook	18.1	14.1	6.0	11.1
Norfolk	18.1	16.6	6.0	10.9
North Platte	18.5	17.0	6.0	11.3
Scotts Bluff	19.2	16.0	6.0	12.0

Discounts to commercial consumers for tank-wagon deliveries covered only by standard commercial consumers contract, effective Jan. 1, 1935.

Central South District

STANDARD OIL CO. OF LOUISIANA

	Gasoline Tank wag. dlr.	Gasoline Tank car con'r.	Gasoline Inc. tax	Kero. tank wag.
N. Orleans, La.	19.75	17.25	*10.0	†12.0
Baton Rouge	17.75	15.25	8.0	12.0
Alexandria	18.25	15.75	8.0	10.5
Lafayette	18.75	16.25	8.0	13.0
Lake Charles	18.75	16.25	8.0	12.5
Shreveport	17.25	14.75	8.0	9.5
Kn'xv'le, Tenn.	20.75	18.25	8.0	14.0
Memphis	18.75	16.25	8.0	12.0
Chattanooga	20.25	17.75	8.0	13.5
Nashville	19.75	17.25	8.0	11.5
Bristol	19.50	18.25	8.0	14.5

*Includes 2-cent parish tax. †Includes 1-cent parish tax and 1-cent state tax.

Price basis to commercial consumers: Effective May 15, 1937, deliveries of 50 gallons or more in one delivery takes posted consumer tank-wagon price. Accounts taking deliveries of less than 50 gallons at one time pay posted consumer tank-wagon price plus 4 cents per gallon. Generally, the posted consumer tank-wagon price will be equivalent to the dealer price less .5 cent per gallon.

Louisiana kerosene prices include 1 cent state tax.

Pennsylvania, Delaware and Part of New England

ATLANTIC REFINING CO.

	Gasoline Tank wag. dlr.	Gasoline Tank car con'r.	Gasoline Inc. tax	Kero. tank wag.
Philadelphia, Pa.	13.25	12.25	5.0	10.5
Pittsburgh	15.0	13.0	5.0	11.0
Allentown	14.25	12.75	5.0	11.0
Erie	14.5	13.0	5.0	10.0
Scranton	14.5	13.0	5.0	11.0
Altoona	15.0	13.0	5.0	11.0
Dover, Del.	14.5	....	5.0	11.0
Wilmington	14.0	....	5.0	11.0
Spring'd, Mass.	13.3	....	4.0	8.5
Worcester	14.3	....	4.0	9.0
Hartford, Conn.	13.6	....	4.0	9.0
New Haven	13.5	....	4.0	9.0
Providence, R. I.	13.5	....	4.0	8.5

Price basis to undivided dealers, dealer tank-wagon price less .5 cent per gallon. Price basis to commercial consumers in Pennsylvania and Delaware, effective March 11, 1937: Consumers under contract using 100,000 gallons or more per year full compartment hose deliveries, tankcar plus .5 cent. Consumers under contract using less than 100,000 gallons per year compartment hose deliveries, undivided dealer price. Consumers under contract less than full compartment delivery, consumers not under contract less than full compartment delivery, and consumers not under contract full compartment delivery, divided dealer price. Less than 25 gallons, tank-wagon delivery, 4 cents per gallon above undivided dealer price.

Oklahoma and Arkansas

CONTINENTAL OIL CO.

	Gasoline Dealer	Gasoline Inc. tax	Kero. tank wag.
Muskogee, Okla.	14.5	5.0	7.0
Oklahoma City	14.0	5.0	8.0
Tulsa	14.0	5.0	6.0
Ft. Smith, Ark.	14.75	5.0	8.0
Little Rock	17.25	7.5	9.5
Texarkana	14.5	5.0	8.5

Texas

	Gasoline Tank wag.	Gasoline Serv. sta.	Gasoline Inc. tax	Kero. tank wag.
Dallas, Tex.	14.0	18.5	5.0	8.0
Fort Worth	14.0	18.0	5.0	8.0
Houston	14.5	19.0	5.0	8.0
San Antonio	14.5	18.5	5.0	8.0

Naphtha

STANDARD OIL CO. (INDIANA)

	Tank-wagon*
Oleum spirits	15.7
V.M.&P. naphtha	16.0
Cleaners' naphtha	15.0
Stanisol	15.0

*Prices include 3-cent Illinois tax, but not 1-cent federal tax or 2 per cent retail occupational tax.

Prices f.o.b. Chicago. Each price subject to discount of 1 cent per gallon for 150 gallon lots if covered by contract.

Canada*

3 Star Imperial Gasoline
IMPERIAL OIL, LTD.

	Tank-wag.	Inc. tax	Kero. tank wag.
Halifax, N.S.	24.0	8.0	18.5
St. John, N.B.	24.0	8.0	18.5
Montreal, Que.	21.0	6.0	17.5
Toronto, Ont.	22.0	6.0	17.0
Hamilton, Ont.	22.0	6.0	17.0
Winnipeg, Man.	27.5	7.0	20.7
Brandon, Man.	29.8	7.0	22.3
Regina, Sask.	28.5	7.0	22.0
Saskatoon, Sask.	31.3	7.0	24.8
Edmonton, Alta.	28.0	7.0	23.0
Calgary, Alta.	25.5	7.0	20.5
Vancouver, B.C.	23.0	7.0	23.0

*Imperial gallon used in Canada.

Divided dealers pay tank-wagon price. Discount to undivided dealers, 1 cent below tank-wagon price. In maritime provinces both divided and undivided dealers pay tank-wagon price.

Retail Price Changes

Standard Oil Co. of Ohio December 24 reduced dealer gasoline .5 cent at points on its statewide schedule.

Standard Oil Co. of Louisiana December 11 advanced tank-wagon kerosene 1 cent in New Orleans.

Standard Oil Co. of California December 21 advanced tank-wagon kerosene 1 cent in Los Angeles and Phoenix, advanced tank-wagon kerosene .5 cent in Fresno and reduced tank-wagon kerosene .5 cent in Spokane; December 21 reduced tank-wagon and station gasoline .5 cent in Spokane.

Socony-Vacuum Oil Co., Inc., December 17 reduced tankcar gasoline .5 cent throughout its territory.

Crude Oil Price Changes

Effective December 22, Standard Oil Co. of California posted the following prices for crude it purchases in the Greeley and Canal fields in California: 27 gravity, 84 cents; 28 gravity, 88 cents; 29 gravity, 92 cents; 30 gravity, 95 cents; 31 gravity, 99 cents; 32 gravity, $1.03; 33 gravity, $1.07; 34 gravity, $1.11; 35 gravity, $1.15; 36 gravity, $1.19; 37 gravity, $1.23; 38 gravity, $1.27; 39 gravity, $1.31; 40 gravity, $1.34; 41 gravity, $1.38; 42 gravity, $1.41; 43 gravity, $1.45; 44 gravity, $1.49; 45 gravity, $1.53; 46 gravity, $1.56; 47 gravity, $1.60; 48 gravity and above, $1.64.

The Canal field is new. It is about 6 miles southwest of the center of the Greeley field in Kern County.

PRICES OF REFINED PRODUCTS

All quotations f.o.b. plant in cars for interstate or export movement except as otherwise noted

Prices of December 28, 1937

The following quotations are exclusive of the federal excise taxes of 1 cent a gallon on gasoline and 4 cents on lubricating oils.

Refinery Gasoline

OKLAHOMA (Group 3)—

U. S. Motor grades:		
62 oct. and below	.04	.04¼
63-66 octane	.04⅜	.04½
67-69 octane	.04⅝	.04⅞
70-72 octane (regular)	.05	.05¼
60-62 400 grades:		
62 oct. and below	.04	.04¼
63-66 octane	.04⅜	.04½
67-69 octane	.04⅝	.04⅞
70-72 octane (regular)	.05	.05¼
64-66 375	.04½	.04¾
68-70 360	.04⅞	.05⅛

NORTH TEXAS—

U. S. Motor grades:		
62 octane and below	.04	.04¼
63-66 octane	.04⅜	.04½
67-69 octane	.04⅝	.04⅞
70-72 octane (regular)	.05	.05¼
60-62 400	.04	.04¼
64-66 375	.04½	.04¾

NORTH LOUISIANA (Ark., N. La. and Miss. delivery)

U. S. Motor grades:		
62 octane and below	.04¾	.05
63-66 octane	.05	.05¼
67-69 octane	.05¼	.05½
70-72 octane (regular)	.05⅝	.05⅞

ARKANSAS (Ark., N. La., Miss. del.)—

U. S. Motor grades:		
62 octane and below	.04½	.04⅞
67-69 octane	.05⅛	.05⅜
70-72 octane (regular)	.05⅝	.05⅞

CHICAGO (Based on Group 3)—

U. S. Motor grades:		
62 octane and below	.04	.04⅜
63-66 octane	.04⅜	.04⅝
67-69 octane	.04⅝	.05
70-72 octane (regular)	.05	.05⅜
60-62 400 grades:		
62 octane and below	.04	.04⅜
63-66 octane	.04⅜	.04⅝
67-69 octane	.04⅝	.05
70-72 octane (regular)	.05	.05⅜
64-66 375	.04¾	.05⅛
68-70 360	.05	.05¼

PENNSYLVANIA (inland refineries)—

58-60 U. S. Motor:		
Below 60 octane	.04¾	.04⅞
60-64.9 octane	.06½	.06¾
65-70 octane	.06¾	.07
64-66 390	.05½	.05¾
68-70 350	.05¾	.06

CALIFORNIA (domestic movement)—

54-58 U. S. Motor	.07½	.08½
58-60 400, 65 oct. and higher	.08¼	.09¼

EAST COAST (Domestic)—

U. S. Motor, 60-64.9 octane:		
*New York (Bayonne)	.07	.07¼
Philadelphia	.07	.07¼
Boston	.07½	.07¾
Baltimore	.07	.07¼
Charleston, S. C.	.07	.07¼
U. S. Motor, 65 and above:		
*New York (Bayonne)	.07⅛	.07⅜
Philadelphia	.07⅛	.07⅜
Boston	.07¼	.07⅝
Baltimore	.07⅛	.07½
Charleston, S. C.	.07¾	.08

*All grades of gasoline one-eighth to one-fourth cent less for barge shipments. New York harbor prices are for New York and New England delivery. Prices for New Jersey delivery one-fourth cent lower.

GULF COAST (domestic)—

U. S. Motor grades:		
Below 60 octane	.05¼	.05½
60-64.9	.05⅝	.05½
65 octane and higher	.05½	.05⅝

Naphtha

PENNSYLVANIA (inland refineries)—

50-52 450 (blending)	.05	.05¼
52-54 450 (blending)	.05	.05¼
54-56 450 (blending)	.05¼	.05⅜

Natural Gasoline

OKLAHOMA (Group 3)—

Grade 26-70		.03
Grade 18-55	.03½	.03⅝

NORTH TEXAS—

Grade 26-70		.03
Grade 18-55	.03½	.03⅝

CALIFORNIA—

75-85 375-390	.06¾	.07½

NORTH LOUISIANA (Ark., N. La. and Miss. delivery)—

Grade 26-70	.03¼	.03½

Tractor Fuel

OKLAHOMA (Group 3)—

40-42 gr., 315-325 i.b.p., 110 flash, 540-550 e.p.	.04¼	.04⅜
41-43 gr., 300-350 i.b.p., 110-125 flash, 500-520 e.p.	.04¼	.04½
46-48 gr., 210-230 i.b.p., 480 max. e.p.	.04¾	.04⅞

Kerosene

(All kerosene water white)

OKLAHOMA (Group 3)—

41-43	.04¼	.04⅜
42-44	.04⅜	.04½

NORTH TEXAS—

41-43	.04¼	.04⅜

NORTH LOUISIANA (Ark., N. La. and Miss. delivery)—

41-43	.04½	.04⅝

ARKANSAS (Ark., N. La., Miss. del.)—

41-43		.04⅝

PENNSYLVANIA (inland refineries)—

45	.05½	.05⅝
46	.05⅝	.05¾
47	.05¾	.05⅞

CHICAGO (Based on Group 3)—

41-43	.04⅛	.04⅜
42-44	.04⅜	.04⅝

CALIFORNIA (Pac. Coast market)—

38-43 high burning test	.05½	.06½

NEW YORK (Bayonne, N. J.)—

41-43		.06 3/10

***GULF COAST (domestic)—**

41-43	.05	.05⅛

*Barge price one-eighth cent lower.

Furnace Oil

OKLAHOMA (Group 3)—

No. 1 prime white, 38-42	.04⅛	.04¼
No. 1 straw, 38-40	.04	.04⅛
No. 2 straw, 32-36	.03⅞	.04
No. 2 dark, 32-36	.03¾	.03⅞
No. 3 zero to 15, 28-32	.03½	.03⅝
No. 3, 15 and above, 28-32	.03	.03⅛

NORTH TEXAS—

No. 1 prime white, 38-42	.04⅛	.04¼
No. 1 straw, 38-40	.04	.04⅛

NORTH LOUISIANA (Ark., N. La. and Miss. delivery)—

No. 2, 32-36		.03⅝

ARKANSAS (Ark., N. La., Miss. del.)—

No. 2, 32-36	.03¾	.04

CHICAGO (Based on Group 3)—

No. 1 prime white, 38-40	.04⅛	.04¼
No. 1 straw, 38-40	.04	.04⅛
No. 2 straw, 32-36	.03⅞	.04
No. 2 dark, 32-36	.03⅝	.03⅞
No. 3, zero to 15, 28-32	.03½	.03⅝
No. 3, 15 and above, 28-32	.03	.03⅛

NEW YORK (Bayonne, N. J.)—

*No. 1		.06 3/10
*No. 2		.05½
*No. 4		.05¼

*Barge deliveries one-eighth to one-fourth cent under above tankcar price.

Gas Oil and Fuel Oil

(Gas oil per gal.; fuel oil per bbl.)

OKLAHOMA (Group 3)—

U.G.I. gas oil	.02⅞	.03
No. 4, low cold test, 24-28	1.10	1.15
No. 4, 15 and above, 24-28	.90	.95
No. 5, low cold test, 18-22	.82½	.87½
Below 18 fuel oil, industrial	.70	.75

NORTH TEXAS—

U.G.I. gas oil	.02⅞	.03
No. 4, low cold test, 24-28	1.10	1.15
No. 5, low cold test, 18-22	.82½	.87½
Below 18 fuel oil, industrial	.70	.75

NORTH LOUISIANA (Ark., N. La. and Miss. delivery)—

10-14 fuel oil, industrial	.80	.85

CHICAGO (Based on Group 3)—

U.G.I. gas oil	.03	.03⅛
No. 4, low cold test, 24-28	1.10	1.15
No. 4, 15 and above, 24-28	.90	.95
No. 5, low cold test, 18-22	.82½	.90
No. 5, 15 and above (18-22)	.80	.85
No. 6, low cold test, 10-16	.75	.82½

PENNSYLVANIA (inland refineries)—

36-40	.04⅞	.05⅛

CALIFORNIA

Los Angeles:		
30-34 gas oil, per bbl.	1.50	1.70
24 plus diesel, per bbl.	1.50	1.70
24 plus diesel (bunkers)	1.60	1.75
12-16 (bunkers at tidewater)	.95	1.00
10-16 (cargo lots)	.88	1.00
12-17 (tankcars)	.95	1.10
10-17 (high sulfur)	.65	1.00
San Joaquin Valley:		
10-18 (tankcars)	.65	.85
21 plus diesel, per bbl.	1.50	1.70
San Francisco:		
24 plus diesel, per bbl.	1.60	1.70
24 plus diesel (bunkers)	1.60	1.70
10-16 (bunkers)	1.00	1.05

GULF COAST—

28-30 gas oil	.04½	.04⅝
28-30 diesel (bunkers)		1.90
Bunkers (bulk cargoes)		.85
Bunker C (bunkers)		1.05

NEW YORK (Bayonne, N. J.)—

27 plus, gas oil	.05	.05¼
28-30 diesel (lighterage 6¼c per bbl.)		2.20
28-30 diesel (tankcars)		.05¼
Bunker C (to ocean-going ships in N. Y. harbor)		1.25
Industrial fuel (tankcars)	.04½	.04¾

Lighterage charge 5c bbl. additional.

Bright and Steam Refined

OKLAHOMA (Group 3)—

Bright Stocks:		
190-200 D, 15-25		.19
150-160 D, 0-10		.16
150-160 D, 15-25		.15
150-160 E, 15-25		.14½
100-110 D, 0-10		.14½
Steam refined:		
631 green (treated)		.13½
600 dark green (untreated)		.05

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pour test	.18	.19
15 pour test	.17	.18
20 pour test	.16	.17
25 pour test	.15	.16
Steam refined:		
600	.07	.08
650	.10½	.11½
600 Pennsylvania flash	.11	.12
630 flash	.14	.15
600 Warren E filtered	.13	.14

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

Zero to 10 Cold Test:	
150-3	.09
180-3	.10
180-4	.09½
200-3	.10½
200-4	.10
250-3	.11½
250-4	.11
280-3	.12½
280-4	.12
300-3½	.13
400-3½	.14
100-2½ paraffin oil	.06
15-20 Cold Test:	
200-3	.10
200-4	.09½
250-3	.11
250-4	.10½
280-3	.12
280-4	.11½

GULF COAST—

Pale Oils:		
200-3	.07	.07¼
300-3	.07½	.07¾
500-3½	.08½	.08¾
750-3½	.08⅝	.09¼
1,200-3½	.09½	.09¾
1,500-4	.09¾	.10
Red Oils:		
200-5-6	.07¼	.07½
300-5-6	.07¼	.07½
500-5-6	.08	.08½
750	.08¾	.09
1,200-5-6	.09¼	.09½

CALIFORNIA (moving to dom. market)—

Pale Oils:		
100-2½-3	.07¼	.08
200-2½-3	.07¼	.08
300-2½-3	.07¼	.08
400-3-4	.07¼	.08
450-3-4	.07¼	.08
550-3-4	.09	.11
600-3-4	.09	.11
Red Oils:		
200-4-5	.07¼	.08
300-5-6	.07¼	.08
350-5-6	.09¼	.11½
400-5-6	.09¼	.11½
450-5-6	.09¼	.11½
500-5-6	.09¼	.11½
600-5-6½	.09¼	.11½
700-6½ plus	.09¼	.11½
750-6½ plus	.09¼	.11½
900-6½ plus	.09¼	.11½

PENNSYLVANIA—

150 vis. at 70° F. color, 400-405 flash:		
Zero pour test	.19	.19½
10 pour test	.18	.18½
15 pour test	.17½	.18
25 pour test	.16½	.17½
180 vis. at 70° F., 3 color 25 pour test	.17½	.18
200 vis. at 70° F., 3 color:		
Zero pour test	.22	.22½
10 pour test	.21	.21½
15 pour test	.20½	.21
25 pour test	.18½	.19

Wax and Petrolatum

(Prices per pound)

OKLAHOMA (Group 3)—

124-126 (a.m.p.) w.c. scale		.03

PENNSYLVANIA (inland refineries)—

122-124 (a.m.p.) w.c. scale	.0285	.0290
124-126 (a.m.p.) w.c. scale	.0285	.0290

NEW YORK—

Wax in bags fully refined:		
122-125 (a.m.p.) wax		.0445
125-127 (a.m.p.) wax		.0455
128-130 (a.m.p.) wax		.0480
130-132 (a.m.p.) wax		.0505
133-135 (a.m.p.) wax		.0535
135-137 (a.m.p.) wax		.0560
124-126 (a.m.p.) w.s.	.0295	.0300
124-126 (a.m.p.) y.s.	.0265	.0280
Petrolatum in barrels, carload lots:		
Dark green		.01⅞
Amber	.02⅞	.03
Extra amber	.03	.03⅛
Lily white	.06⅝	.06¾
Snow white	.07¾	.07⅞
Cream	.05⅝	.05¾

Export Prices

GASOLINE

GULF COAST—

U. S. Motor	.05⅜	.05½
60-62 400	.05⅝	.05½
61-63 390		.05⅝
64-66 375		.05¾

LOS ANGELES—

U. S. Motor grades:		
55-65 octane	.05¾	.06
65-69 octane		.06¼
Above 69 octane		.06½

KEROSENE

GULF COAST—

41-43 prime white		.05⅛
41-43 water white		.05¼
44 water white		.05⅜

LOS ANGELES—

41-43 water white	.04½	.05

LUBRICANTS

(Pennsylvania Grade)

NEW YORK (f.a.s. in bbls.)—

Cylinder Stocks:		
600 Warren E	.21½	.22
600 S.R. unfiltered	.16½	.17
630 S.R. unfiltered	.21	.21½
600 flash, S.R.	.21½	.22
630 flash, S.R.	.25½	.26
Bright Stocks:		
8 color	.23½	.24
6½ plus color in dilution	.23	.23½

NEUTRAL OIL

200-3 color	.30	.30½
150-3 color	.25½	.26

PARAFFIN WAX

NEW YORK (prices per pound)—

123-126 a.m.p.		.04125
125-127 a.m.p.		.0425
128-130 a.m.p.		.0450
133-135 a.m.p.		.0525
135-137 a.m.p.		.0550
Crude Scale:		
124-126 w.s.	.0295	.0300
124-126 y.s.	.0265	.0280

CRUDE OIL PRICES

Oklahoma, Kansas, North Central and East Central Texas

(January 28, 1937)

East Texas (May 22, 1937)*	$1.35
Van, Tex.†	1.10
Camp Hill, Tex.	1.27
Cass County, Tex.‡	1.25
Talco	.73
Altus and Tipton, Okla.§	1.20
Other fields (see gravity table).	

*All companies. †Humble Oil & Refining Co.; Pure Oil Co. ‡Texas Co. §Gulf Oil Co. Talco by Humble Oil & Refining Co.

West Texas

See gravity table.

Pecos County*	.91
Pecos shallow†	.81

*Shell Petroleum Corp., Gulf Pipe Line Co., and Humble Oil & Refining Co. †Shell Petroleum Corp.

Rocky Mountain States

(Effective January 28, 1937)

Iles, Colo., light*	$1.18
Iles, Colo., heavy*	1.12
Greybull, Wyo.*	1.30
Torchlight, Wyo.*	1.30
Grass Creek, Wyo., light*†	1.30
Grass Creek, Wyo., heavy (Nov. 4, 1936)*†	.62
Hamilton Dome, Wyo. (Jan. 1, 1937)*	.67
Elk Basin, Wyo., light*†	1.30
Frannie, Wyo., heavy*	.62
Frannie, Wyo., light	.70
Hogback, New Mex. (Jan. 1, 1937)*	1.21
Pondera, Mont. (Jan. 26, 1936)*	1.05
Salt Creek Dutton Creek and Midway, Wyo., take Stanolind's Oklahoma prices on a gravity basis.	
Big Muddy, Wyo.†	1.23
Rock Creek, Wyo.†	1.20½
Lea County, N. M. (see West Texas gravity table)	
Artesia, N. Mex. (Jan. 28, 1937)†	.92
Maljamar, N. Mex. (Jan. 28, 1937)	.92
Canon City and Florence, Colo.	1.10
Lance Creek, Wyo.	.97
Sunburst, Mont. (Nov. 16, 1937)†	.90
Cat Creek, Mont. (Oct. 25, 1937) gr. scale $1.05 below 35°; $1.30 above 40°.	
Cut Bank, Mont. (Oct. 25, 1937), (posted by Northwest Refining Co.)	1.10
Garland, Wyo. (Jan. 1, 1937)†	.50

*Stanolind Oil & Gas Co. †Ohio Oil Co. ‡Continental Oil Co. Cut Bank by Toronto Pipe Line Co.

Southwest Texas

(January 28, 1937)

Pettus	1.37
Salt Flat, Darst Creek, Hilbig, Carroll, Clark, Zoboroski	1.09
Luling	1.00
Lytton Springs	1.12

Saxet and Taft take same gravity table as Gulf Coast.

North Louisiana and Arkansas

Smackover, all grades	$ .90
Tullos and Urania	1.02
El Dorado East field	.90
Union County, Ark.	.90
Ouachita County, Ark.	.90
Lisbon, La. (Dec. 13, 1937)*	.98

*Caddo Crude Oil Purchasing Co.

Gulf Coast

(January 28, 1937)

Choctaw and Darrow, La. See note below	
Clay Creek, Tex.	$1.00
Garden Island, La.	1.37
Cleveland, Tex.	1.27
Hardin, Tex.	1.15
Lafitte, La.	1.24
Livingston, Tex.	1.27
Welsh, La.	.98
Tepetate (La.) (Jan. 4, 1937)	1.12

Duval, Jim Hogg, Webb and Zapata counties, Texas, and Heyser and Placedo fields take Mirando gravity prices. Jennings, La., 5 cents lower than Gulf Coast prices on each degree. Segno, Texas, takes Gulf Refining Co.'s Gulf Coast prices. Choctaw and Darrow, Louisiana, posted for first time by Standard Oil Co. of Louisiana, start below 21 degrees at 90 cents, with 3-cent differential up to 25 gravity, then 2-cent differential up to 40 and above, $1.36. Effective October 1, 1937, Stanolind Oil & Gas Co. in Evangeline, La., pays 92 cents for below 20 gravity, adding 2 cents for each degree upward to 40 and over, at $1.34.

Eastern States

TIDE WATER ASSOCIATED OIL CO.
(Effective December 1, 1937)

Bradford, Pa.	$2.20
Allegany, N. Y.	2.20

SOUTH PENN OIL CO.
(Effective December 1, 1937)

Pennsylvania Grade Oil in National Transit Lines (Bradford field)	2.20
Pennsylvania Grade Oil in Southwest Pennsylvania Lines	1.88
Pennsylvania Grade Oil in Eureka Pipe Line lines	1.82
Pennsylvania Grade Oil in Buckeye Pipe Line lines	1.70
Corning Grade Oil in Buckeye Pipe Line Co.'s lines	1.27

PENNZOIL CO.
(Effective December 1, 1937)

Pennsylvania Grade Oil in National Transit Lines:	
Group A — Includes Cochran, Franklin, Hamilton and Doolittle districts.	2.15
Group B — Includes Tidioute district.	2.14
Group C — Includes Turkey and Tidioute districts.	2.13
Group D — Includes Bear Creek and Porkey districts.	2.12
Group E — Includes Eldeneau, Bull Creek, Rough Run, Carbon, Dipner, Bredlin, McJunkin, Jameson, Kenerdell, Emlenton, Tiona, Lacey and Kinzua districts.	2.10

PURE OIL CO.
(Effective December 1, 1937)

Cabin Creek, W. Va.	1.82
Bradford Hollow, W. Va.	1.82
Kelly Creek, W. Va.	1.82

Middle Western States

OHIO OIL CO.
(Effective January 28, 1937)

Lima	$1.25
Illinois	1.35
Princeton, Ind.	1.35
Midland, Mich. (July 23, 1937)*	1.27
West Branch, Mich. (July 22, 1937)	1.09
Buckeye (July 23, 1937)	1.24½
Arenac, Mich (July 1, 1937)	1.21
Muskegon, Mich.	1.00
Eastern Kentucky:	
Big Sandy River	1.42
Kentucky River	1.50
Western Kentucky	1.40

*Posted by Pure Oil Co. Midland, Mich., price posted by Simrall Corp. and Pure Oil Co. includes Greendale, Porter, Beaverton, Crystal and equal grades. West Branch and Arenac by Simrall Corp. Eastern Kentucky crude purchased by Ashland Refining Co., Ashland, Ky. Buckeye posted by Simrall Corp. and Pure Oil Co.

Canada

Ontario (Sept. 9, 1933)*

Petrolia	$2.10
Oil Springs	2.17
TURNER VALLEY NAPHTHAS AND CRUDE OIL (September 1, 1937, by Imperial Oil, Ltd.)	
Clear naphtha and discolored naphtha, 65 gravity and higher	$2.30
Discolored naphtha and crude oil 40-40.9 gravity	1.90
Increasing 2 cents for each degree gravity with top price for 64-64.9 gravity	1.94
These prices f.o.b. producers field tankage.	

*Imperial Oil, Ltd.

Mexico

Heavy Mexican crude	$.90

*In U. S. currency, f.o.b. ship, based on November spot market transactions.

Rocky Mountain Runs

Production estimates for week ended December 25:

WYOMING

Salt Creek	16,060
Big Muddy	880
Badger Basin	250
Black Mountain	200
Bryon	4,140
Dallas Derby	560
Dutton Creek	50
Elk Basin	30
Frannie	70
Garland	2,750
Grass Creek	100
Hidden dome	320
Hudson	310
LaBarge	980
Lance Creek	11,850
Lost Soldier	1,260
Medicine Bow	5,190
Midway	60
Oregon Basin	4,000
Osage	750
Pilot Butte	20
Quealy dome	710
Rock River	3,070
South Casper	500
Poison Spider	320
Teapot	20
Wertz	310
Waugh dome	40
Total Wyoming	54,800

MONTANA

Border	20
Cat Creek	550
Cut Bank	7,770
Dry Creek	450
Kevin-Sunburst	3,830
Pondera	940
Total Montana	13,560

COLORADO

Florence	130
Fort Collins and Wellington	210
Iles dome	2,880
Moffatt	380
Orchard	20
Rangely	80
Tow Creek	140
Price	600
Total Colorado	4,440

NEW MEXICO

Cooper	5,370
Eaves	1,050
Eunice	28,280
Hardy	1,610
Hobbs	16,140
Jal	1,300
Langlie	2,910
Lynch	680
Lynn	530
Mattix	2,500
Monument	30,170
Penrose	4,500
Rhoades	130
Skelly	1,830
South Eunice	2,370
Vacuum	150
Artesia-Maljamar	6,810
Getty	200
Hogback	200
Rattlesnake	820
Table Mesa	100
Total New Mexico	107,650
Total Rocky Mountain region	180,450

C. C. Bankhead, engineer for the Shell Oil Co., formerly located in Bakersfield, Calif., has been transferred to Long Beach, that state. Daniel Meany, engineer at the Long Beach office, has taken Mr. Bankhead's place.

Crude Prices by Gravities

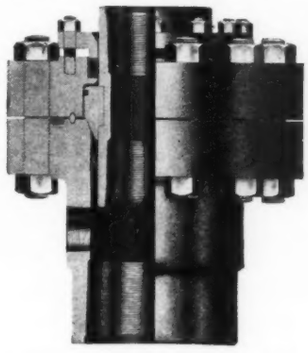
	1 Oklahoma-Kansas	2 Oklahoma-Kansas	3 North and Central Texas	4 East Central Texas (Mexia district)	5 North Louisiana-Arkansas	6 Gray County, Texas	7 Hutchinson-Carson counties, Texas	8 Rodessa, Louisiana-Texas and Panola County, Texas	9 Conroe, Tomball, Raccoon Bend, (Deep) Saloma	10 Gulf Coast	11 Gulf Coast	12 Lea County, N. Mex. West Texas except Pecos County	13 Mirando district, Texas	14 Marion County, Texas	15 Refugio, Greta, Saxet, Taft, Texas	16 Anahuac, Flour Bluff, Dickson, Turtle Bay	17 White Castle, Louisiana	18 Iowa, Louisiana	19 Cayuga, Texas
Bel. 18	....	....	....	....	....	....	....	....	....	$.90	....	....	....	....	....	....	....	$.90	....
18-18.9	....	....	....	....	....	....	....	....	....	.92	....	....	....	....	....	....	....	.92	....
19-19.9	....	....	....	....	....	....	....	....	....	.94	....	....	....	....	....	....	....	.94	....
20-20.9	....	....	....	....	....	....	....	....	....	.96	$.95	....	$.96	....	$1.01	....	....	.96	....
21-21.9	....	....	....	....	....	....	....	....	....	.98	.98	....	.98	....	1.03	....	....	.98	....
22-22.9	....	....	....	....	....	....	....	.. .	....	1.01	1.01	....	1.00	....	1.05	....	1.01	1.01	....
23-23.9	....	....	....	....	....	....	....	....	....	1.04	1.04	....	1.02	....	1.07	....	1.04	1.04	....
24-24.9	....	....	....	....	....	....	....	....	....	1.07	1.07	....	1.04	....	1.09	....	1.07	1.07	....
Bel. 25	....	$.98	....	....	$.90	....	....	$.93	....	....	....	....	....	$.90	....	....	....	....	$.88
25-25.9	....	1.00	....	....	.92	....	....	.95	....	1.10	1.10	$.78	1.06	.92	1.11	....	1.10	1.10	.90
26-26.9	....	1.02	....	....	.94	....	....	.97	....	1.13	1.13	.80	1.08	.94	1.13	....	1.13	1.13	.92
27-27.9	....	1.04	....	....	.96	....	....	.99	....	1.15	1.15	.82	1.10	.96	1.15	....	1.15	1.15	.94
28-28.9	....	1.06	....	....	.98	....	....	1.01	....	1.17	1.17	.84	1.12	.98	1.17	....	1.17	1.17	.96
Bel. 29	$1.06	....	$.96	$1.03	....	....	....	....	$1.20	....	....	....	....	....	....	....	....	....	....
29-29.9	1.08	1.08	.98	1.05	1.00	....	....	1.03	1.22	1.19	1.19	.86	1.14	1.00	1.19	....	1.19	1.19	.98
30-30.9	1.10	1.10	1.00	1.07	1.02	....	....	1.05	1.24	1.21	1.21	.88	1.16	1.02	1.21	$1.16	1.21	1.21	1.00
31-31.9	1.12	1.12	1.02	1.09	1.04	....	....	1.07	1.26	1.23	1.23	.90	1.18	1.04	1.23	1.18	1.23	1.23	1.02
32-32.9	1.14	1.14	1.04	1.11	1.06	....	....	1.09	1.28	1.25	1.25	.92	1.20	1.06	1.25	1.20	1.25	1.25	1.04
33-33.9	1.16	1.16	1.06	1.13	1.08	....	....	1.11	1.30	1.27	1.27	.94	1.22	1.08	1.27	1.22	1.27	1.27	1.06
34-34.9	1.18	1.18	1.08	1.15	1.10	....	....	1.13	1.32	1.29	1.29	.96	1.24	1.10	1.29	1.24	1.29	1.29	1.08
Bel. 35	....	....	....	....	....	$.96	$.91	....	....	....	....	....	....	....	....	....	....	....	....
35-35.9	1.20	1.20	1.10	1.17	1.12	.98	.93	1.15	1.34	....	1.31	.98	1.26	1.12	1.31	1.26	1.29	1.29	....
36-36.9	1.22	1.22	1.12	1.19	1.14	1.00	.95	1.17	1.36	....	1.33	1.00	1.28	1.14	1.33	1.28	1.29	1.29	....
37-37.9	1.24	1.24	1.14	1.21	1.16	1.02	.97	1.19	1.38	....	1.35	1.02	1.30	1.16	1.35	1.30	1.29	1.29	....
38-38.9	1.26	1.26	1.16	1.23	1.18	1.04	.99	1.21	1.40	....	1.37	1.04	1.32	1.18	1.37	1.32	1.29	1.29	....
39-39.9	1.28	1.28	1.18	1.25	1.20	1.06	1.01	1.23	1.42	....	1.39	1.06	1.34	1.20	1.39	1.34	1.29	1.29	....
40,over	1.30	1.30	1.20	1.27	1.22	1.08	1.03	1.25	1.44	....	1.41	1.08	1.36	1.22	1.41	1.36	1.29	1.29	....

Column 1—Companies posting are Barnsdall, Bell, Champlin, Continental, Cushing, Derby, Bay, Eason, El Dorado, Cities Service, Falcon, Globe, Gulf, Johnson, Kanotex, National, Phillips, White Eagle, Stanolind, Sunray, Texas, Sun Vickers and Wilcox.
Column 2—Anderson & Prichard, Carter, Cosco, Deep Rock, Magnolia, Mid-Continent, Pure, Rock Island, Shell, Sinclair, Skelly and Tide Water.
Column 3—All purchasers.
Column 4—Humble Oil & Refining Co. and Sinclair Oil Purchasing Co.
Columns 5, 6, 7 and 8—All purchasers.
Column 9—Humble Oil & Refining Co. and Sun Oil Co. Tidewater Oil Co.'s schedule starts at 35 degrees, $1.34 with 2-cent spread up to 40 and over at $1.44. (Raccoon Bend prices are for deep sand oil.)
Column 10—The Texas Co. (Gulf Refining Co. pays same prices up to and including 34 gravity, but continues its 2-cent spread up to 40 and over at $1.41.)
Column 11—Humble Oil & Refining Co., Sinclair Prairie Oil Marketing Co., Sun Oil Co.
Column 12—All purchasers.
Column 13—All purchasers (effective July 6, 1937).
Column 14—Magnolia Petroleum Co.
Column 15—Humble Oil & Refining Co. (effective July 6, 1937).
Column 16—Humble Oil & Refining Co.
Columns 17 and 18—Shell Petroleum Corp.
Column 19—Tide Water Oil Co.

NEW OR IMPROVED EQUIPMENT

Rectorhead Is Designed to Meet Demand of High Pressures

The Rector Well Equipment Co., Fort Worth, Tex., to keep step with present-day deeper drilling and resulting high pressures, developed the new



type EH Rectorhead, 10,000-pound test, for extreme pressures. This high-pressure head is equipped with A.P.I. 1,500 series flange bolting and packing arrangement. It is made with an inside thread only, and is fitted with the grade D long-collar recessed coupling.

Further development in the Rectorhead line includes the new type AH head, supplementary to the H, and the new type AM, supplementary to the M.

The AH Rectorhead is 6,000-pound test, all hammer-forged alloy-steel construction, with outside thread on bottom end, and has the A.P.I. series 900 flange bolting and packing arrangement. It too is fitted with the grade D long-collar recessed coupling.

The AM head is 4,000-pound test, 3130 alloy caststeel body with hammer-forged suspension members, and has the series 900 A.P.I. flange bolting and packing arrangement. It is regularly furnished with inside thread on bottom end and grade C recessed coupling, although fitting it with forged-steel welded nipple on bottom end and grade D long thread recessed coupling is optional.

All three of these improved Rectorheads have in addition to the standard A.P.I. iron ring packing, two rows of one-half inch hydraulic packing in the bottom flange.

Couplings For Burma Line

For use on a new 58⅝-inch O.D. water line at Rangoon, Burma, India, the S. R. Dresser Manufacturing Co., Bradford, Pa., manufacturer of flexible pipe couplings, reports receipt of an order totaling approximately 9,000 couplings for this 45-mile project. Pipe is being manufactured by Stewarts and Lloyds of England. Construction work is to start in the early part of 1938.

Bulletins, Booklets and Other Literature for the Trade

The Spartan Aircraft Co., Tulsa, announces a new all-metal four- or five-place airplane, the Executive, in an illustrated bulletin, sent on request.

The part diesel engines play in the development of the Quiriquire oil field of eastern Venezuela provides an interesting article in the latest number of Baldwin-Southwark, quarterly publication of the Baldwin-Southwark Corp., Philadelphia, Pa.

"How to Handle Loads Safely" is the title of a 16-page illustrated booklet offered by the Macwhyte Co., Kenosha, Wis., manufacturer of wire rope and wire-rope slings.

A new 24-page industrial thermometer catalog, No. 1125B, has been published by the C. J. Tagliabue Manufacturing Co., Park and Nostrand Avenues, Brooklyn, N. Y., maker of indicating, recording and controlling instruments.

An ingenious method of automatically eliminating vapor-locking in centrifugal pumps is explained in the current issue of the Armstrong Trap Magazine, published by the Armstrong Machine Works, Three Rivers, Mich.

Why spark ignition is used in the Hesselman oil engine is explained in an article by J. B. Fisher, vice president and chief engineer of the Waukesha Motor Co., Waukesha, Wis., in the current issue of the Waukesha Engineering Record, published by that company.

American Flange Patent Upheld

The Supreme Court of the United States has denied Byrne Manufacturing Co. a review of the Circuit Court finding that the company had infringed on a patent of American Flange Manufacturing Co., of New York and Chicago. The Byrne company, the lower court held, had infringed in making and supplying a mechanically inserted flange for steel drums. The American flange, more generally known as the Tri-Sure flange, is used throughout the world on petroleum, food oil, syrup and chemical drums.

This action by the highest court makes final the validation of the American Flange Co.'s rights in the mechanically inserted flange, the method of affixing it to a drum, and the combination of the steel drum and flange, attorneys for the company state. The patent involved is known as the Schwartz patent.

To Visit Caribbean Oil Fields

In line with its policy of checking laboratory investigations through observation of its products under actual operating conditions, the Pittsburgh Equitable Meter Co. and the affiliated Merco Nordstrom Valve Co. send a factory expert on periodic inspections to industries which use the Nordstrom lubricated plug valves and Pittsburgh and EMCO metering equipment. Inspections in the oil fields are to be extended to include the important properties of the Caribbean. This work has been entrusted to James H. Baker, who has represented the manufacturers in the Texas and Oklahoma fields for the past 12 years. Mr. Baker's itinerary, planned by the ARMCO International Corp. export representative, and will include Colombia, Venezuela, and Trinidad. He will leave the middle of January.

Texas Steel's Oil-Field Supply Division Under New Charter

The oil-field supply department of the Texas Steel Co., Fort Worth, Tex., will be operated under a separate charter beginning January 1, the new corporation being Texasteel Manufacturing Co. Texasteel will take over the plant, assets and management of the oil-country supply division. Organized under the laws of Texas with a paid-

Judge George W. Armstrong, George W. Armstrong, Jr., Allen J. Armstrong

up capital stock of $300,000, it will manufacture the line of oil-field pumping equipment at present made by the Texas Steel Co., including all standard sizes and various types of high-tensile and low-metalloid electric steel sucker-rods, electric steel pull-rods, double- and single-crank pumping units, pumping-jacks, backside stroke-post assemblies, and rod-line surface equipment, crownblocks, stuffing-boxes, tubing-heads, bullplugs, swage nipples, etc.

The officers of the new company are: Judge George W. Armstrong, president; A. J. Armstrong, vice president and general manager; George W. Armstrong, Jr., vice president; Jess W. Emery, vice president and general sales manager; John F. Foster, secretary-treasurer. Judge Armstrong is also president of the parent organization, the Texas Steel Co., founded in 1907.

Acquires Smith Meter Co.

W. C. Heath, president of the A. O. Smith Corp., Milwaukee. Wis., has announced the acquisition by his company of the Smith Meter Co., manufacturer of rotary-truck, loading-rack, and refinery meters. Reorganization of the manufacturing and sales departments is now in progress to increase production and enable this concern to meet demands from the petroleum industry.

Emrick Organizes Company

Bert R. Emrick, Inc., is a new corporation recently chartered by Bert R. Emrick for the servicing or deepening of wells in the Gulf Coast territory. Organization of this company follows completion of special work Mr. Emrick has been doing with Stanolind Oil & Gas Co. A heavy-duty portable well-servicing unit has been moved into the Corpus Christi, Tex., area to begin work before January 1, 1938. Mr. Emrick will be able to bring to the Gulf Coast the experience of many years obtained in the Burma oil fields. The first unit moved into service is capable of handling wells of 8,000- to 9,000-foot depths. Headquarters for Bert R. Emrick, Inc., has been established at 1018 Travis Street, Houston, Tex.

DELEGATES FROM 21 NATIONS AT 1936 TULSA EXPOSITION

Some of the delegates and officials, from 21 different nations, who attended the 1936 International Petroleum Exposition at Tulsa

The International Petroleum Exposition is planning to provide special tours, lectures and entertainment for the delegates and representatives of the 20 to 25 countries expected to attend the May 14 to 21, 1938, show at Tulsa, according to President W. G. Skelly.

Tours of the larger refineries of the Mid-Continent, the largest producing area in the world, discussions and displays of the latest development in aerial photography, use of the seismograph and portable rotaries will be included.

In addition the international committee will provide a tour of the exposition for the delegates from other countries in order that they may have explained to them the latest equipment and methods. The committee will be headed by James H. Gardner, president of Gardner Petroleum Co. of Tulsa.

Of especial interest will be the scientific and technical exhibits, in the new Hall of Science, prepared under the direction of Dr. Gustav Egloff, internationally known scientist, who is chairman of the scientific committee. Doctor Egloff was delegate last summer for the American Petroleum Institute to the second World Petroleum Congress.

The delegates from abroad have been extended an official invitation by the United States government to attend the Tenth International Petroleum Exposition, through a bill passed by congress and signed by President Roosevelt. They are thus assured of an official welcome from the United States as well as the cordiality of exposition officials and exhibitors. During the exposition they will be entertained at an international luncheon given by the Tulsa branch of the Rotary International Club.

CLASSIFIED ADVERTISING

Leases and Drilling Blocks

SECURITY ABSTRACT COMPANY
El Dorado, Arkansas
Fee, Lease & Mineral Ownership
on short notice. Ownership maps.

Specializing leases twenty acres up dollar acre, East Tex., La., S. Ark. Owners—Attorney, Box 1122, Little Rock, Arkansas.

New Mexico OIL LEASES WHOLESALE
40 acres at a time.
Roy G. Barton, Clovis, New Mexico.

YOAKUM CO., Tex. oil lease S. halves Sec. 596 and 597 in ¼ by 2 mile tracts across "high," in favorable drilling sites for $15 per acre, $1 delay rental. Dr. J. A. Robinson, Vets. Adm., Los Angeles, Cal.

CHOICE LEASES, large and small tracts. South Texas, favorable trend. Brookfield Exploration Company, Milam Building, San Antonio, Texas.

PRODUCING PROPERTIES
Having just established a sales department to accommodate clients who wish to buy or sell PRODUCING oil properties, we seek inquiries from interested buyers and sellers.
We now have for sale 15 PRODUCING properties, ranging from 5 to 1,000 bbls. daily. Several suitable for flooding.
We are prepared to give details and technical opinions.
F. W. FREEBORN ENGINEERING CORPORATION
Appraisers—Engineers—Operators
For the Oil and Gas Industry
Alexander Building—Tulsa, Oklahoma

OIL LEASES Illinois Basin and 400 acres Posey County, Indiana. Leo H. Graves, Farina, Illinois.

FOR SALE—Leases & Royalty. Land in fee $4 and up per acre. Also drilling blocks. J. N. SWANSON, Sayre, Okla.

Leases and Drilling Blocks

OFFSET LEASE between producers available. West Big Springs Field. Contract for 3,000 feet and bonus. Roscoe Gillean, 207 E. 31, Austin, Texas. Ph. 3709.

Leases and Drilling Blocks

SELLING Crane County, Texas, Sec. 18, B-28, nearby Magnolia's Pecos High Ordovician, bargain. Address Landowner, 4009 Ave. G, Austin, Tex.

CLASSIFIED DISPLAY RATES

Classified Display is set with a border and may be used in one or two column sizes.

1 Inch	*1 time*	*$5.00*
1 Inch	*13 times*	*4.50 per inch*
1 Inch	*26 times*	*4.00 per inch*
1 Inch	*52 times*	*3.50 per inch*

This space may be contracted for over a period of one year from the date of the first insertion and is PAYABLE IN ADVANCE, MONTHLY.

CLASSIFIED

Classified advertising rates: First insertion, 35 cents a line; each additional insertion, 25 cents a line, PAYABLE IN ADVANCE. Six words usually make a line. Count as a word each one-letter word and each group of figures. White-space computed at regular line rate. Allow two extra lines for blind ads. Ads of less than three lines not accepted. No formal acknowledgement is made, and proofs cannot be shown in advance of publication.

	1 time	2 times	3 times	4 times		1 time	2 times	3 times	4 times
3 Lines	*$1.05*	*$1.80*	*$2.55*	*$3.30*	*7 Lines*	*$2.45*	*$4.20*	*$5.95*	*$7.70*
4 Lines	*1.40*	*2.40*	*3.40*	*4.40*	*8 Lines*	*2.80*	*4.80*	*6.80*	*8.80*
5 Lines	*1.75*	*3.00*	*4.25*	*5.50*	*9 Lines*	*3.15*	*5.40*	*7.65*	*9.90*
6 Lines	*2.10*	*3.60*	*5.10*	*6.60*	*10 Lines*	*3.50*	*6.00*	*8.50*	*11.00*

We reserve the right to withhold all advertising of questionable character. To avoid delay be sure to send remittance with copy. We will set your ad in the smallest amount of space possible and refund all overpayments. One-time insertions will not be run until fully paid. Forms close MONDAY NOON before each issue date.

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Patent Attorneys

JACK A. SCHLEY
PATENT LAWYER
Patents obtained — infringement practice in all Courts—oil field experience. 1807-11 Tower Petroleum Bldg., Dallas. 2014 Second Nat'l. Bank Bldg., Houston. 707 Insurance Building, San Antonio. 433 Munsey Building, Washington, D. C. Address any of these offices.

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All cases submitted given personal attention by members of the firm.
Form "Evidence of Conception" and instructions
"How to Establish Your Rights"—Free
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Patent Law Offices
418 Bowen Bldg. Washington, D. C.

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SUCCESSFUL OIL OPERATORS
Are Using
ZINGERY OIL MAPS
Our Up-to-date Lease and Fee Ownership Maps of Counties and Combination Development Maps Save Time and Money.
WRITE FOR DESCRIPTIVE FOLDER
1937 Revised Edition Map of State of Texas, eastern N. M., parts of southern Okla., SW Ark. and La. shows Oil and Gas Fields in color, Counties and County seat and elevations, co-ordinated alphabetical index of fields and counties.
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ZINGERY OIL MAP COMPANY
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CLASSIFIED ADVERTISING

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BEING OFFERED AND DISMANTLED

150—80,000 bbl. Steel roof tanks, Clayton Farm, Wyo.
100—55,000 bbl. Steel roof five ring tanks, Seminole, Okla.
Offered as is or cut down or reerected on customers grade.
"Steel plates for every purpose."

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry or H. J. Galamba —Wire—Phone—Write— Robt. W. Duden
Riverview at Second St., Kansas City, Kansas 2100 South Union St., Tulsa, Oklahoma

25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x6 Ingersoll-Rand ER-1 Air compressor, Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.
Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St. Cincinnati, Ohio

FOR SALE: 1—20' x 128' sectional steel building knocked down in our Oklahoma City warehouse, $850.00. I. T. I. O., Bartlesville, Okla.

WELDERS A.C. and D.C. electric motor and engine driven. Reconditioned. Service Co., 3732 Cedar Ave., Cleveland, Ohio.

The Classified Section of The Oil and Gas Journal, for over 30 years the market place of the oil industry.
Reading this section every week can become a profitable habit.—Cultivate it.
Classified Department
THE OIL AND GAS JOURNAL

FOR SALE—At our Oklahoma City warehouse. 2—12" figure 3065 used reconditioned Goulds single stage centrifugal pumps mounted on base for use with electric motor. I. T. I. O., Bartlesville. Okla.

DRILLING RIGS, drill pipe, boilers, and any kind of used rotary drilling equipment. Immediate delivery. Write, wire or phone M. ROSENBLOOM PIPE & SUPPLY CO., 3538 Mansfield Road, Shreveport, La.

FOR SALE—Two Rotary Drilling Rigs in West Texas and New Mexico. Herschbach Drilling Company, Dallas and Kermit, Texas.

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Mailing Lists

ROYALTY INVESTORS, by deed. Personnel lists of oil industry. Oil Industry Mailing List Co., Tulsa Loan Bldg., Tulsa, Okla.

LATE AUTHENTIC addresses 200 Oil Operators South Texas for $1.00. A. L. Hood, 321 Piedmont, San Antonio, Texas.

WEST TEXAS oil and business directory. Postpaid $2.00. Texas Oil Directory Co., P. O. Box 1711, Big Spring, Texas.

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